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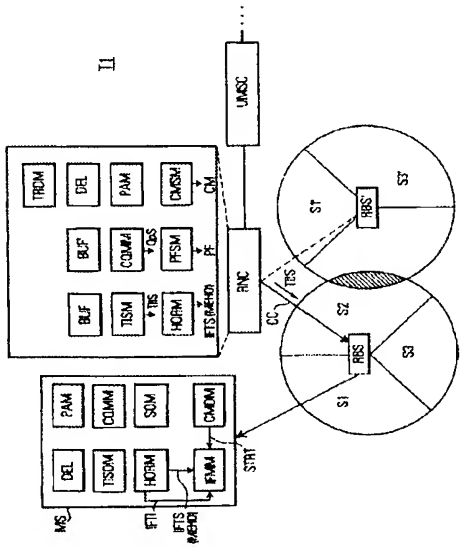
最終頁に続く

(54)【発明の名称】　移動通信システムにおける周波数間測定を実行する加入者局、ネットワーク制御手段及び方法

(57)【要約】
移動通信システム（Ｔ１）において、ネットワーク制御手段（ＲＮＣ）内の時間間隔選択手段（ＴＩＦＭ）が時間間隔を選択し、この時間間隔に関する指示を時間間隔指示信号中で加入者局（ＭＳ）に送信する。加入者局（ＭＳ）内の時間間隔信号判定手段（ＴＩＦＤＭ）が時間間隔を検出し、ＩＦ測定手段（ＩＦＭＭ）がネットワーク制御手段（ＲＮＣ）に指定された、検出された時間間隔において、周波数間／システム間測定を実行する。この時間間隔において、通信接続（ＣＣ）上のサービス品質ＱｏＳの一時的な低下がネットワーク制御手段（ＲＮＣ）によって計画される。しかし、遅延に敏感なデータ伝送又は欠損に敏感なデータ伝送のいずれが実行されるかとは無関係に、ネットワーク制御手段（ＲＮＣ）はサービス品質の一時的な低下を補償するための準備を行うことが可能である。そのような手順は、ＩＦ測定を、圧縮モード動作によってサービス品質の一時的な低下が常に許容される、圧縮されたタイムスロットの待機時間間隔で行うことよりも優れている。



【特許請求の範囲】

【請求項１】　少なくとも１つの基地送受信局（ＲＢＳ）及び、周波数間（ＩＦ）測定の実行に適合されたＩＦ測定手段（ＩＦＭＭ）を含むネットワーク制御手段（ＲＮＣ）を有する移動通信システム（ＧＳＭ；ＷＣＤＭＡ）の加入者局（ＭＳ）であって、

前記ネットワーク制御手段（ＲＮＣ）からの伝送中で、前記加入者局（ＭＳ）と前記基地送受信局（ＲＢＳ）間に確立された接続（ＣＣ）の時間間隔であって、前記加入者局（ＭＳ）がＩＦ測定を行うべき時間間隔を指定するＩＦ測定時間間隔指示信号（ＴＩＩＳ）を検出するように適合された時間間隔信号検出手段（ＴＩＳＤＭ）を有し、

前記ＩＦ測定手段（ＩＦＭＭ）が前記ＩＦ測定時間間隔指示信号（ＴＩＳＳ）中に指定された前記時間間隔において前記ＩＦ測定を行うように適合されていることを特徴とする加入者局。

【請求項２】　前記ＩＦ測定手段（ＩＦＭＭ）が、前記ＩＦ測定を時間間隔全体に渡って行うように適合されていることを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項３】　前記ＩＦ測定手段（ＩＦＭＭ）が、前記時間間隔における前記ＩＦ測定を、ＩＦ測定トリガ信号（ＩＦＴＳ）に応答して開始するように適合されていることを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項４】　前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）が前記ＩＦ測定トリガ信号（ＩＦＴＳ）に含まれることを特徴とする請求項３記載の加入者局（ＭＳ）。

【請求項５】　前記ＩＦ測定トリガ信号（ＩＦＴＳ）が前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているとＩＦハンドオーバ要求手段（ＨＯＲＭ）が判定した（ＮＥＨＯ；ＭＥＨＯ）際に前記ＩＦハンドオーバ手段（ＨＯＲＭ）によって生成されることを特徴とする請求項３又は請求項４記載の加入者局（ＭＳ）。

【請求項６】　前記ＩＦハンドオーバ手段（ＨＯＲＭ）が前記移動通信システムのネットワーク制御手段（ＲＮＣ）内に位置し、ネットワーク評価ハンドオ

ーバ（ＮＥＨＯ）の決定に応答して、前記ＩＦ測定トリガ信号（ＩＦＴＳ）を、基地送受信局（ＲＢＳ）を介して前記加入者局（ＭＳ）へ送信するように適合されていることを特徴とする請求項３又は請求項４記載の加入者局（ＭＳ）。

【請求項７】　前記ＩＦハンドオーバ手段（ＨＯＲＭ）が前記加入者局（ＭＳ）内に位置し、移動局評価ハンドオーバ（ＭＥＨＯ）の決定に応答して、前記ＩＦ測定トリガ信号（ＩＦＴＳ）を出力するように適合されていることを特徴とする請求項３又は請求項４記載の加入者局（ＭＳ）。

【請求項８】　前記加入者局（ＭＳ）が、

前記確立された通信接続（ＣＣ）上のサービス品質（ＱｏＳ）を監視し、前記ネットワーク制御手段（ＲＮＣ）に前記サービス品質（ＱｏＳ）の情報を送信するように適合された接続品質監視手段（ＣＱＭＭ）を有することを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項９】　前記接続（ＣＣ）の間、前記基地送受信局（ＲＢＳ）と前記加入者局（ＭＳ）との間で遅延に敏感なデータ伝送が行われるとともに、

前記加入者局（ＭＳ）が、

前記時間間隔中に前記基地送受信局（ＲＢＳ）から到達したデータを削除するための削除手段（ＤＥＬ）と、

前記時間間隔の開始前及び／又は前記時間間隔の終了後に前記通信接続（ＣＣ）上のアップリンクにおける送信電力を増加させる電力調整手段（ＰＡＭ）を有することを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項１０】　前記接続（ＣＣ）の間、前記基地送受信局（ＲＢＳ）と前記加入者局（ＭＳ）との間で損失に敏感なデータ伝送が行われることを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項１１】　前記前記加入者局（ＭＳ）と基地送受信局（ＲＢＳ）との間のデータ伝送が、データ部分（ＤＰ）及び制御部分（ＣＰ）を含むデータフレーム（ＦＲ）の送信を介して実行されるとともに、

前記加入者局（ＭＳ）と前記基地送受信局（ＲＢＳ）との間のデータ伝送が、データ伝送が行われない待機時間間隔がタイムスロットに提供されるよう、少なくとも１つの前記タイムスロット内の前記データ部分（ＤＰ）中の伝送データが

圧縮される圧縮モードによって実行され、

前記加入者局（ＭＳ）が前記圧縮モードでのデータ伝送を検出する圧縮モード検出手段（ＣＭＤＭ）を含み、

前記時間間隔が前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）で指示された複数のデータフレームとデータ伝送が圧縮モードで行われるデータフレームの複数の待機時間間隔に対応することを特徴とする請求項１記載の加入者局（ＭＳ）。

【請求項１２】　前記ＩＦ測定手段（ＩＦＭＭ）が、データ伝送が前記基地送受信局（ＲＢＳ）から発生する追加時間間隔においても測定を実施し、

前記加入者局（ＭＳ）が前記追加時間間隔中に到達したデータを削除する削除手段（ＤＥＬ）を有することを特徴とする請求項１又は請求項１１記載の加入者局（ＭＳ）。

【請求項１３】　少なくとも１つの基地送受信局（ＲＢＳ）及びネットワーク制御手段（ＲＮＣ）を有する移動通信システム（ＧＳＭ；ＷＣＤＭＡ）の加入者局（ＭＳ）において周波数間（ＩＦ）測定（ＳＴ２１；ＳＴ２１’’；ＳＴ２１’’’’）を実行する方法であって、

前記加入者局（ＭＳ）及び前記基地送受信局（ＲＢＳ）間の接続（ＣＣ）中に、ネットワーク制御手段（ＲＮＣ）においてＩＦ測定時間間隔を選択するステップ（ＳＴ２１１）と、

前記ネットワーク制御手段（ＲＮＣ）から前記加入者局（ＭＳ）へ、前記加入者局（ＭＳ）によって前記ＩＦ測定を行うべき前記接続（ＣＣ）の前記時間間隔を指示するＩＦ測定時間間隔指示信号（ＴＩＩＳ）を送信するステップ（ＳＴ２１１）と、

前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）で指示されるように、前記接続の前記時間間隔中に前記加入者局（ＭＳ）において前記ＩＦ測定を行うステップ（ＳＴ２１２）とを有することを特徴とする方法。

【請求項１４】　前記ＩＦ測定が前記時間間隔全体に渡って行われることを特徴とする請求項１３記載の方法。

【請求項１５】　ＩＦ測定トリガ信号（ＩＦＴＳ）に応答して前記ＩＦ測定が実施される（ＳＴ１３）ことを特徴とする請求項１３記載の方法。

【請求項１６】　前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）が前記ＩＦ測定トリガ信号（ＩＦＴＳ）中で送信（ＳＴ１３；ＳＴ２１１）されることを特徴とする請求項１５記載の方法。

【請求項１７】　前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているか否かを判定するステップ（ＳＴ１１）と、

ＩＦハンドオーバが必要であると判定された（ＮＥＨＯ；ＭＥＨＯ）際に、前記ＩＦ測定トリガ信号（ＩＦＴＳ）を生成するステップＳ（ＳＴ１３）とを有することを特徴とする請求項１５記載の方法。

【請求項１８】　前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているか否かを判定する前記ステップ（ＳＴ１１）が、前記移動通信システムのネットワーク制御手段（ＲＮＣ）内に位置するＩＦハンドオーバ要求手段（ＨＯＲＭ）によって実行され、

ネットワーク評価ハンドオーバ（ＮＥＨＯ）の決定に応答して、前記ＩＦ測定トリガ信号（ＩＦＴＳ）が前記基地送受信局（ＲＭＳ）を介して前記加入者局（ＭＳ）へ送信される（ＳＴ１３）ことを特徴とする請求項１７記載の方法。

【請求項１９】　前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているか否かを判定する前記ステップ（ＳＴ１１）及び、前記ＩＦ測定トリガ信号（ＩＦＴＳ）の生成が、移動局評価ハンドオーバ（ＭＥＨＯ）の決定に応答して、前記加入者局（ＭＳ）内に位置するＩＦハンドオーバ要求手段（ＨＯＲＭ）によって実行されることを特徴とする請求項１７記載の方法。

【請求項２０】　確立された通信接続上のサービス品質（ＱｏＳ）が前記加入者局（ＭＳ）において監視されるとともに、前記サービス品質（ＱｏＳ）の情報が前記ネットワーク制御手段（ＲＮＣ）へ送信されることを特徴とする請求項１３記載の方法。

【請求項２１】　確立された通信接続上のサービス品質（ＱｏＳ）が前記基地送受信局（ＲＢＳ）において監視されるとともに、前記サービス品質（ＱｏＳ）の情報が前記ネットワーク制御手段（ＲＮＣ）へ送信されることを特徴とする

請求項１３記載の方法。

【請求項２２】　前記通信接続の前記時間間隔が前記サービス品質（ＱｏＳ）の前記情報に基づいて選択されるとともに、

前記時間間隔が、前記ＩＦ測定手段（ＩＦＭＭ）が前記ＩＦ測定を行うことによる前記サービス品質の一時的な悪化が許可される時間間隔として選択されることを特徴とする請求項２０又は請求項２１記載の方法。

【請求項２３】　前記接続の間遅延に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記時間間隔中に到達した前記基地送受信局（ＲＢＳ）からのデータが削除され、前記時間間隔の開始前及び／又は前記時間間隔の終了後に前記通信接続上のダウンリンク（ＤＬ）及びアップリンク（ＵＬ）上の送信電力が増加されることを特徴とする請求項１３記載の方法。

【請求項２４】　前記接続の間損失に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記通信接続の前記ダウンリンク上で送信される前に、前記送信データが、前記ネットワーク制御手段（ＲＮＣ）内の所定サイズを有する送信バッファ手段（ＢＵＦ）内に一時保存され、

前記ＩＦ測定手段（ＩＦＭＭ）によって前記ＩＦ測定が実行される前記時間間隔において、前記送信バッファ手段（ＢＵＦ）が、前記時間間隔において送信されるべき前記送信データの少なくとも一部を一時的に保存し、

前記時間間隔の終了後、前記ネットワーク制御手段（ＲＮＣ）が前記保存されたデータを前記加入者局（ＭＳ）へ送信することを特徴とする請求項１３記載の方法。

【請求項２５】　前記接続の間損失に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記ネットワーク制御手段（ＲＮＣ）が、前記送信データが前記通信接続の前記ダウンリンク（ＤＬ）上で送信される前に中間記憶するための、所定サイズの送信バッファ手段（ＢＵＦ）を有し、

前記ＩＦ測定手段（ＩＦＭＭ）によって前記ＩＦ測定が行われる前記時間間隔

において、前記ネットワーク制御手段（ＲＮＣ）がデータ伝送速度を減少させるとともに、前記時間間隔の終了後再び前記データ伝送速度を上昇させることを特徴とする請求項１３記載の方法。

【請求項２６】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、より大きな送信データの中間記憶用記憶容量を供給するため、前記ネットワーク制御手段（ＲＮＣ）が他のバッファ手段（ＢＵＦ’）を用いて再スケジュールを実行することを特徴とする請求項２５記載の方法。

【請求項２７】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、前記バッファ手段の前記バッファサイズを増加させ、他のバッファ手段（ＢＵＦ’）のバッファサイズを減少させるため、前記ネットワーク制御手段（ＲＮＣ）が前記他のバッファ手段（ＢＵＦ’）を用いて動的バッファスケジュールを実行するように適合されていることを特徴とする請求項２５記載の方法。

【請求項２８】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、前記ネットワーク制御手段（ＲＮＣ）の削除手段が前記時間間隔中に送信されるべきデータの少なくとも１部を削除することを特徴とする請求項２５記載の方法。

【請求項２９】　前記ＩＦハンドオーバ要求手段（ＨＯＲＭ）が送信／受信されたデータフレーム（ＦＲ）間の比、及び前記測定時間を判定するように適合された伝送比判定手段（ＴＲＤＭ）を有し、

前記送信／受信比が所定の比を下回った際に前記ＩＦハンドオーバ要求手段（ＨＯＲＭ）が前記ＩＦ測定トリガ信号（ＩＦＴＳ）を出力することを特徴とする請求項２８記載の方法。

【請求項３０】　前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）間のデータ伝送が、データ部分（ＤＰ）及び制御部分（ＣＰ）を含むデータフレーム（ＦＲ）の送信を介して実行されるとともに、

圧縮モード動作において、データフレームの少なくとも１つのタイムスロット中の前記データ部分（ＤＰ）のデータが、前記タイムスロット中にデータ伝送が

発生しない待機時間間隔（ＩＴ）を供給するよう前記ネットワーク制御手段（ＲＮＣ）において圧縮され（ＳＴ２１’）、

前記圧縮モードでのデータ伝送が前記加入者局（ＭＳ）で検出され（ＳＴ２１’’）、

前記時間間隔が、前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）で指示された複数のデータフレームと、データ伝送が圧縮モードで行われる（ＳＴ２１’’）データフレームの複数の待機時間間隔（ＩＴ）に対応することを特徴とする請求項１３記載の方法。

【請求項３１】　前記ＩＦ測定が、データ伝送が前記基地送受信局（ＲＭＳ）から発生する追加時間間隔においても実施され、

前記追加時間間隔中に前記基地送受信局（ＲＢＳ）から到達したデータが前記加入者局（ＭＳ）で廃棄されることを特徴とする請求項１３又は請求項２５記載の方法。

【請求項３２】　周波数間（ＩＦ）測定の実行に適合されたＩＦ測定手段（ＩＦＭＭ）を含む、少なくとも１つの加入者局（ＭＳ）と、少なくとも１つの基地送受信局（ＲＢＳ）及び、接続の間前記加入者局（ＭＳ）とデータ伝送を行うための前記ネットワーク制御手段（ＲＮＣ）を有する移動通信システム（ＧＳＭ；ＷＣＤＭＡ）であって、

前記ネットワーク制御手段（ＲＮＣ）が、

前記加入者局（ＭＳ）がＩＦ測定を行うべき前記接続の時間間隔を選択し、前記時間間隔を指示するＩＦ測定時間間隔指示信号（ＴＩＩＳ）を前記加入者局（ＭＳ）に送信するように適合されたＩＦ測定時間間隔選択手段（ＴＩＳＭ）を有し、

前記加入者局（ＭＳ）が、

前記ネットワーク制御手段（ＲＮＣ）からの伝送中において、前記時間間隔を指示する前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）を検出するように適合された時間間隔信号検出手段（ＴＩＳＤＭ）を有し、

前記ＩＦ測定手段（ＩＦＭＭ）が、前記検出された前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）内で指定された前記時間間隔で前記ＩＦ測定を行うように適合

されていることを特徴とするシステム。

【請求項３３】　前記ＩＦ測定手段（ＩＦＭＭ）が、前記ＩＦ測定を時間間隔全体に渡って行うように適合されていることを特徴とする請求項３２記載のシステム。

【請求項３４】　前記ＩＦ測定手段（ＩＦＭＭ）が、ＩＦ測定トリガ信号（ＩＦＴＳ）に応答して前記ＩＦ測定を行うように適合されていることを特徴とする請求項３３記載のシステム。

【請求項３５】　前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているか否かを判定し、ＩＦハンドオーバが必要であると判定された（ＮＥＨＯ；ＭＥＨＯ）際に前記ＩＦ測定トリガ信号（ＩＦＴＳ）を生成するように適合されたＩＦハンドオーバ要求手段（ＨＯＲＭ）を更に有することを特徴とする請求項３２記載のシステム。

【請求項３６】　前記ＩＦハンドオーバ要求手段（ＨＯＲＭ）が前記加入者局（ＭＳ）内に位置し、移動局評価ハンドオーバ（ＭＥＨＯ）の決定に応答して、前記ＩＦ測定トリガ信号（ＩＦＴＳ）が生成されることを特徴とする請求項３５記載のシステム。

【請求項３７】　前記加入者局（ＭＳ）が、

前記確立された通信接続上のサービス品質（ＱｏＳ）を監視し、前記ネットワーク制御手段（ＲＮＣ）に前記サービス品質（ＱｏＳ）の情報を送信するように適合された接続品質監視手段（ＣＱＭＭ）を有することを特徴とする請求項３２記載のシステム。

【請求項３８】　前記基地送受信局（ＲＢＳ）が、

前記確立された通信接続上のサービス品質（ＱｏＳ）を監視し、前記ネットワーク制御手段（ＲＮＣ）に前記サービス品質（ＱｏＳ）の情報を送信するように適合された接続品質監視手段（ＣＱＭＭ）を有することを特徴とする請求項３２記載のシステム。

【請求項３９】　前記ＩＦ測定時間間隔選択手段（ＴＩＳＭ）が前記通信接続の前記時間間隔を前記サービス品質（ＱｏＳ）の前記情報に基づいて選択するとともに、

前記時間間隔が、前記ＩＦ測定手段（ＩＦＭＭ）が前記ＩＦ測定を行うことによる前記サービス品質の一時的な悪化が許可される時間間隔として選択されることを特徴とする請求項３７又は請求項３８記載のシステム。

【請求項４０】　前記通信接続の間、遅延に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）間で行われ、

前記加入者局（ＭＳ）が、

前記時間間隔の間に前記基地送受信局（ＲＢＳ）から到達したデータを削除する削除手段（ＤＥＬ）を有し、

前記ネットワーク制御手段（ＲＮＣ）及び前記加入者局（ＭＳ）の各々が、それぞれ前記通信接続のダウンリンク（ＤＬ）及びアップリンク（ＵＬ）上の伝送電力を、前記時間間隔の開始前及び／又は前記時間間隔の終了後に増加させる電力調整手段（ＰＡＭ）を有することを特徴とする請求項３９記載のシステム。

【請求項４１】　前記損失に敏感なデータ伝送がウェブブラウジング中のデータ伝送であることを特徴とする請求項３２記載のシステム。

【請求項４２】　前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）間でのデータ伝送が、制御部分（ＣＰ）及びデータ部分（ＤＰ）を含むデータフレーム（ＦＲ）の送信によって実行され、

前記ネットワーク制御手段（ＲＮＣ）が、

圧縮モード動作において、データフレームの少なくとも１つのタイムスロット中の前記データ部分（ＤＰ）のデータを、前記タイムスロット中にデータ伝送が発生しない待機時間間隔（ＩＴ）を供給するよう圧縮するように適合された圧縮モード動作手段（ＣＭＯＭ）を有し、

前記加入者局（ＭＳ）が、

前記圧縮モードでのデータ伝送を検出する圧縮モード検出手段（ＣＭＤＭ）を有し、

前記時間間隔が前記ＩＦ測定時間間隔指示信号（ＴＩＩＳ）で指示された複数のデータフレーム及び圧縮モードでデータ伝送が実行されるデータフレームの複数の待機時間部分に対応することを特徴とする請求項３２記載のシステム。

【請求項４３】　確立された接続上における、少なくとも加入者局（ＭＳ）

と少なくとも１つの基地送受信局（ＲＢＳ）との間のデータ伝送を制御するための、移動通信システムのネットワーク制御手段（ＲＮＣ）であって、

前記加入者局（ＭＳ）がＩＦ測定を行うべき時間間隔を選択し、前記時間間隔を含むＩＦ測定時間間隔指示信号（ＴＩＩＳ）を前記加入者局（ＭＳ）に送信するように適合されたＩＦ測定時間間隔選択手段（ＴＩＳＭ）を有することを特徴とするネットワーク制御手段（ＲＮＣ）。

【請求項４４】　前記ＩＦ測定時間間隔選択手段（ＴＩＳＭ）から、前記ＩＦ測定時間間隔指定信号（ＴＩＩＳ）をＩＦ測定トリガ信号（ＩＦＴＳ）とともに送信することを特徴とする請求項４３記載のネットワーク制御手段（ＲＮＣ）。

【請求項４５】　前記移動通信システム内の伝送状態が前記加入者局（ＭＳ）のＩＦハンドオーバを必要としているか否かを判定し、ＩＦハンドオーバ（ＮＥＨＯ；ＭＥＨＯ）が必要であると判定された際に前記ＩＦ測定トリガ信号（ＩＦＴＳ）を生成するＩＦハンドオーバ要求手段（ＨＯＲＭ）を有することを特徴とする請求項４４記載のネットワーク制御手段（ＲＮＣ）。

【請求項４６】　前記ＩＦ測定時間間隔選択手段（ＴＩＳＭ）が前記通信接続の前記時間間隔をサービス品質（ＱｏＳ）情報に基づき選択し、

前記時間間隔が、前記ＩＦ測定手段（ＩＦＭＭ）が前記ＩＦ測定実行によるサービス品質の一時的な低下が許される時間間隔となるべく選択されることを特徴とする請求項４３記載のネットワーク制御手段（ＲＮＣ）。

【請求項４７】　前記通信接続の間、遅延に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記ネットワーク制御手段（ＲＮＣ）が、

前記時間間隔の開始前及び／又は前記時間間隔の終了後、前記通信接続のダウンリンク上の伝送電力をそれぞれ増加させる電力調整手段（ＰＡＭ）を有することを特徴とする請求項４５記載のネットワーク制御手段（ＲＮＣ）。

【請求項４８】　前記通信接続の間、損失に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記ネットワーク制御手段（ＲＮＣ）が、

前記通信接続のダウンリンク上で送信される前の前記伝送データの中間記憶用の所定サイズの送信バッファ手段（ＢＵＦ）を有し、

前記ＩＦ測定手段（ＩＦＭＭ）によって前記ＩＦ測定が実行される前記時間間隔において、前記送信バッファ（ＢＵＦ）が、前記時間間隔中に送信されるべき前記伝送データの少なくとも１部を一時的に記憶し、前記ネットワーク制御手段（ＲＮＣ）が前記時間間隔の終了後に前記記憶されたデータを前記加入者局（ＭＳ）へ送信することを特徴とする請求項４６記載のネットワーク制御手段（ＲＮＣ）。

【請求項４９】　前記通信接続の間、損失に敏感なデータ伝送が前記基地送受信局（ＲＢＳ）及び前記加入者局（ＭＳ）の間で行われ、

前記ネットワーク制御手段（ＲＮＣ）が、

前記通信接続のダウンリンク上で送信される前の前記伝送データの中間記憶用の所定サイズの送信バッファ手段（ＢＵＦ）を有し、

前記ＩＦ測定手段（ＩＦＭＭ）によって前記ＩＦ測定が実行される前記時間間隔において、前記ネットワーク制御手段（ＲＮＣ）が、前記データ伝送の速度を減少させ、前記時間間隔の終了後に再度前記データ伝送の速度を上昇させることを特徴とする請求項４６乃至請求項４８のいずれか１項に記載のネットワーク制御手段（ＲＮＣ）。

【請求項５０】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、伝送データの前記中間記憶用のより大きな記憶容量を提供するため、前記ネットワーク制御手段（ＲＮＣ）が他のバッファ手段（ＢＵＦ’）を用いて再スケジュールを実行するように適合されていることを特徴とする請求項４８記載のネットワーク制御手段（ＲＮＣ）。

【請求項５１】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、前記バッファ手段の前記バッファサイズを増加させ、他のバッファ手段（ＢＵＦ’）のバッファサイズを減少させるため、前記ネットワーク制御手段（ＲＮＣ）が前記他のバッファ手段（ＢＵＦ’）を用いて動的バッファスケジュールを実行するように適合されている

ことを特徴とする請求項４８記載のネットワーク制御手段（ＲＮＣ）。

【請求項５２】　前記時間間隔中に送信されるべきデータ量が前記バッファ手段（ＢＵＦ）の前記所定サイズよりも大きい場合、前記ネットワーク制御手段（ＲＮＣ）の削除手段（ＤＥＬ）が前記時間間隔中に送信されるべき前記データの少なくとも１部を削除することを特徴とする請求項４８記載のネットワーク制御手段（ＲＮＣ）。

【請求項５３】　前記ＩＦハンドオーバ要求手段（ＨＯＲＭ）が送信及び受信されたデータフレーム（ＦＲ）間の比、及び前記測定時間を判定するように適合された伝送比判定手段（ＴＲＤＭ）を有し、

前記送信／受信比が所定の比を下回った際に前記ＩＦハンドオーバ要求手段（ＨＯＲＭ）が前記ＩＦ測定トリガ信号（ＩＦＴＳ）を出力することを特徴とする請求項４５記載のネットワーク制御手段（ＲＮＣ）。

【請求項５４】　少なくとも１つの基地送受信局（ＲＢＳ）、請求項４３乃至請求項５３のいずれか１項以上に記載のネットワーク制御手段（ＲＮＣ）及び請求項１乃至請求項１２のいずれか１項以上に記載の少なくとも１つの加入者局（ＭＳ）とを有することを特徴とする移動通信システム。

【発明の詳細な説明】

【０００１】

（発明が属する技術分野）

本発明は移動通信システムにおける周波数間(inter-frequency)測定を実行する加入者局、ネットワーク制御手段及び方法に関する。本発明はまた、そのような加入者局、ネットワーク制御手段及び方法が用いられる移動通信システムに関する。

【０００２】

以下に詳細を説明するように、移動通信システムにおいて加入者局及び基地送信局間の接続（通信接続又はシグナリング接続）の伝送状態は監視され、例えば伝送状態が劣化した場合に、周波数間又はシステム間ハンドオーバの必要性が検出される。周波数間又はシステム間ハンドオーバの必要性が検出されると、この必要性を示すために周波数間測定トリガ信号が生成され、現在使用中の周波数とは異なる周波数に対する周波数間測定が開始される。トリガ信号に応答して、１つ又は複数の異なる周波数について周波数間測定が実行され、好適な新しい周波数が見つかった場合、実際の周波数間又はシステム間ハンドオーバが行われる。以後、「ハンドオーバ」という言葉は、明確に記載しない場合であっても、周波数間又はシステム間ハンドオーバを表す。

【０００３】

基地送信局と加入者局間で接続が確立すると、アクティブモードの加入者局と信号接続のみが確立された場合であっても、その接続においては常にいくらかのデータトラフィックが存在し、加入者局及びネットワークはデータ伝送がないときに周波数間測定を行わねばならない。これは、周波数間測定を行わないと、おそらく接続上を通信されたデータの一部が失われるからである。他の重要な観点は、周波数間測定を開始するため、ネットワークによっていつ、どのように周波数間測定トリガ信号を生成べきであるかということである。しかし、周波数間測定そのものは、周波数間測定トリガ信号に応答して加入者局で常に実行されることに留意すべきである。

【０００４】

本発明は特に、加入者局においてこれら周波数間測定を行うためにどの時間間隔を用いるべきかという問題を解決する。

以下、周波数間は「ＩＦ」と短縮表記する。

【０００５】

（背景技術）

移動通信システムにおけるＩＦ測定をトリガするための従来方法に関し、図１は少なくとも２つの異なる移動通信システムＴ１，Ｔ２を有する電気通信システムＴＥＬＥの一般的な概観を示している。例えば移動局ＭＳである加入者局は、第１の移動通信システムＴ１で動作可能であり、第２の移動通信システムＴ２においても動作可能であってよい。各移動通信システムＴ１、Ｔ２の内部で、移動局ＭＳは異なるセルＳ１，Ｓ２，Ｓ３，Ｓ１’，Ｓ３’及びＣ１－Ｃ６を動き回ることが可能である。異なるハンドオーバ基準によって、移動局ＭＳは同一システム内での周波数間ハンドオーバか、他方のシステムへ／からのシステム間ハンドオーバを実行する。ここで、本発明が同一システム内での周波数間ハンドオーバ及び／又はシステム間ハンドオーバをトリガするのに等しく良好に適用可能であり、図１はそれら両方のハンドオーバ手順が起こりうる例として２つの移動通信システムＴ１，Ｔ２を示すに過ぎないことに留意すべきである。

【０００６】

図１に、第１の移動通信システムＴ１の一例として、ネットワーク制御手段ＲＮＣ(Radio Network Controller)と、少なくとも１つの基地送受信局ＲＢＳ、ＲＢＳ’（ＷＣＤＭＡにおいては無線基地局と呼ばれる）と、少なくとも１つの加入者局ＭＳ(Mobile Station)及び多数の（おそらく）オーバラップしたセルＳ１，Ｓ２，Ｓ３，Ｓ１’，Ｓ３’を有するＷＣＤＭＡ(Wideband Code Division Multiple Access)又はＣＤＭＡ(Code Division Multiple Access)通信システムを示す。

【０００７】

第２の移動通信システムＴ２の一例は、ＧＳＭ(Global System for Mobile Communications)、ＰＤＣ(Personal Digital Cellular)及びＤ－ＡＭＰＳ(Digital-Advanced Mobile Personal Service)規格に従った通信システムである。

【０００８】

図１において、ＧＳＭシステムの一例が第２の移動通信システムＴ２として示される。しかし、本発明は基本的に任意の形式のディジタル移動電話システムに適用可能であり、従って上述のシステムに限定されないことに留意すべきである。図１に示すＧＳＭシステムは従来の基地局コントローラＢＳＣ、少なくとも１つの移動通信交換局ＭＳＣ及び関門移動通信交換局ＧＭＳＣを有する。移動局ＭＳは移動局ＭＳが移動可能なセルＣ１－Ｃ６内の複数の基地送受信局ＢＴＳによってサービスを提供される。

【０００９】

図１におけるＷＣＤＭＡシステムのネットワーク制御手段ＲＮＣはＵＭＳＣユニットを介してＧＳＭシステムの関門移動通信交換局ＧＭＳＣに接続される。

【００１０】

第１及び第２の移動通信システムＴ１，Ｔ２の地理的な配置に応じて、第１の移動通信システムＴ１のセルＳ１，Ｓ２，Ｓ３，Ｓ１’，Ｓ３’もまた、第２の移動通信システムＴ２のセルＣ１－Ｃ６と完全に、又は部分的にオーバラップして良い。もちろん、移動局ＭＳがシステム間ハンドオーバを行うものであれば、移動局ＭＳは第１及び第２の移動通信システムの使用に従って動作可能であろう。

【００１１】

図１における電気通信システムＴＥＬＥにおいて周波数間又はシステム間ハンドオーバを行う１つの理由は、カバー可能な範囲に関する理由(coverage reasons)による。これは、第１の通信システムのみならず、いかなる他のシステムも全ての地理的領域、例えばＵＭＴＳのホットスポットを完全にカバーすることはできないという事実による。さらに、移動通信システム内の一部のセルは隣接セルに適用できない周波数で動作しているかもしれない。従って、移動局ＭＳ又はネットワーク制御手段ＲＮＣに周波数間ハンドオーバ又はシステム間ハンドオーバのいずれかを実施させることによって、通信を中断することなく移動局ＭＳをより広い領域で利用することが可能になる。

【００１２】

ハンドオーバを行う別の理由は容量に関する理由(capacity reasons)である。この移動通信システム又は他の移動通信システムの一方がたまに重い負荷を受けるかもしれず、従ってこの場合システム間ハンドオーバが必要になる。同様に、移動局ＭＳがある特定の周波数で接続を確立され、その後別の周波数を使用しなければならなくなるかもしれない。この別の周波数は同一セル内部又は他のセル内に存在し、いずれも一般に周波数間ハンドオーバと呼ばれる。図１に示すように、周波数間測定（周波数間ハンドオーバ及び／又はシステム間ハンドオーバに必要）は移動局ＭＳに設けられた周波数間測定手段ＩＦＭＭによって常時実行される。

【００１３】

ネットワーク制御手段ＲＮＣは、既に加入者局ＭＳ及びネットワーク間にシグナリング通信リンクが確立されている場合に、呼び出しフラグを移動局ＭＳへ送信する呼び出しフラグ送信手段ＰＦＳＭを有する。例えば、移動局ＭＳが起動されており、かつネットワークに登録されている場合、加入者局は既登録かつ非アクティブモード動作にある。スタンバイ動作手段ＳＯＭは加入者局を非アクティブモード動作に維持する。そのような非アクティブモード動作では、加入者局ＭＳの動作はネットワーク制御手段ＲＮＣからの呼び出しフラグＰＦ受信時、すなわち、加入者局ＳＳに対する呼が保留中であり、通信接続が加入者局ＭＳへ設定される際に起動される。

【００１４】

図２は、シグナリング接続又は通信接続が確立される際に移動通信システムにおいて周波数間ハンドオーバ又はシステム間ハンドオーバを実行する方法の全体的なフローチャートを示す。ステップＳＴ１１で、ネットワーク制御手段ＲＮＣ又は加入者局ＭＳに設けられたハンドオーバ手段ＨＯＲＭ(HandOveR Means)が上述したように、容量／カバー可能な範囲(coverage)という状況に関してネットワーク性能を監視する。ステップＳＴ１２では、ハンドオーバ手段ＨＯＲＭがステップＳＴ１１で判定された基準に従って、大筋でハンドオーバが必要であるか否かについて決定する。もし必要であれば（ステップＳＴ１２で「Ｙ」の場合）、ステップＳＴ１３で移動局が周波数間測定の実施を開始するようトリガされる。

より具体的には、ステップＳＴ１３において、ＩＦ測定トリガ信号ＩＦＴＳがハンドオーバ手段ＨＯＲＭから出力される。図１に示すように、ＩＦ測定手段ＩＦＭＭは、ステップＳＴ１３において、移動局評価ハンドオーバ(Mobile-evaluated-handover)トリガ信号ＩＦＴＳ又はネットワーク評価ハンドオーバ(Network-evaluated-handover)トリガ信号ＩＦＴＳによりトリガ可能である。

【００１５】

必要な際に高速で信頼できる周波数間ハンドオーバを実施するため、ネットワーク制御手段ＲＮＣ及び／又は移動局ＭＳ内部で信頼できるトリガ信号ＩＦＴＳの出力を提供することが好ましい。もちろん、良く設計されたトリガ手順を提供するため、ステップＳＴ１１において監視が必要とされ、最終的に移動局ＭＳに対し他の周波数又はシステム上でＩＦ測定を実施するようにトリガするトリガ条件は１つでない。通常、数個の条件がステップＳＴ１１において監視されるとともに、ステップＳＴ１３でトリガ信号が出力されるためにはそれらが満たされる必要がある。そのような条件は例えば（ネットワークから加入者局への）ダウンリンク接続又は（加入者局からネットワークへの）アップリンク接続からの過度に高い出力、及び／又はセル内の高負荷を有することができる。例えばネットワークがアップリンク干渉を測定することによってセル内の高負荷を検出したとすると、ネットワークはＩＦ測定、従って異なるセル又は異なるシステムへのハンドオーバをトリガしようとする。同様に、送信状態が劣化した場合、移動局ＭＳはその出力をますます増加させるようにトリガされ、従って高出力がまたＩＦ測定及びハンドオーバの必要性を示すことになる。

【００１６】

従来技術文献TS 25 231 V0.3.0,技術仕様：３ＧＰＰ(Third Generation Partnership Project)；技術仕様グループ（ＴＳＧ）、無線アクセスネットワーク（ＲＡＮ）；ワーキンググループ１（ＷＧ１）；ＩＳ９５規格における物理レイヤ測定、１９９９年７月（以下、文献［１］と呼ぶ）は特に3.、4.、5.1.2章において、従来の様々な測定トリガ基準を記述している。文献［１］に記載された移動通信システムでは、ネットワークハンドオーバ手段ＨＯＲＭ及び加入者局ハンドオーバ手段ＨＯＲＭの両方が無線リンク（ＲＬ）の性能を監視し、またハンド

オーバ要求を行うことが可能である。例えば、ネットワークハンドオーバ手段ＨＯＲＭがダウンリンクを加入者局ＭＳからの測定報告によって監視する。ネットワークハンドオーバ手段ＨＯＲＭはまた、トラフィック負荷についても監視する。

【００１７】

上述の通り、移動局ＭＳによって評価されるハンドオーバは移動局評価ハンドオーバ、略してＭＥＨＯと呼ばれ、ネットワークによって評価されるハンドオーバはネットワーク評価ハンドオーバ、略してＮＥＨＯと呼ばれる。図１に示すように、移動局ＭＳ及びネットワーク制御手段ＲＮＣの各々がハンドオーバ手段ＨＯＲＭを有し、それぞれ監視されるトリガ状況に従ってハンドオーバを開始することが可能である。従来技術におけるステップＳＴ１１で監視中に監視される４つの基本基準は、以下に説明するとともに上述の文献［１］にも示されるように、「基地局トラフィック負荷超過」状態、「距離制限超過」状態、「パイロット強度が予め定められた閾値基準を下回った」状態及び「電力レベル超過」状態である。

【００１８】

最初に、「基地局トラフィック負荷超過」状態に関して、ネットワークハンドオーバ手段ＨＯＲＭは、移動通信システムＴ１内の全基地局ＢＳにおける負荷を監視し、ハンドオーバの必要性を判定する。そして、全基地局間での負荷を平均化し、より高いトラフィック効率を達成するため、ＩＦ測定信号ＩＦＴＳを出力する。例えば、ネットワークハンドオーバ手段ＨＯＲＭは、基地局の負荷が予め定められた負荷閾値を超えた場合には常にステップＳＴ１３においてトリガ信号を出力する。

【００１９】

２番目に、「距離制限超過」状態に関して、加入者ハンドオーバ手段及び／又はネットワークハンドオーバ手段ＨＯＭは基地局ＢＳ及び加入者局ＭＳの距離監視に基づいてハンドオーバの必要性を判定するように適合される。関連する基地局及び加入者局の距離は、同期システムにおいて判定可能である。そのため、測定された距離が予め定められた距離を超える場合には常にステップＳＴ１３にお

いてトリガ信号ＩＦＴＳが出力される。

【００２０】

３番目に、「パイロット強度が予め定められた閾値基準を下回った」状態に関して、加入者ハンドオーバ手段及び／又はネットワークハンドオーバ手段は、ハンドオーバの必要性を、測定パイロット信号強度が予め定められた電力閾値を下回ることの監視に基づいて判定するように適合されている。図３－１及び図４－１に示すように、近代的な移動通信システムにおいて、基地送受信局ＲＢＳ及び加入者局ＭＳ間でのデータ伝送は、制御部ＣＰ及びデータ部ＤＰから構成されるデータフレームＦＲ及び送信フレームＦＲを送信することによって実施される。これはＣＤＭＡフレーム（図３－１）及びＧＳＭシステムでのＴＤＭＡフレーム（図４－１）について正しい。制御部ＣＰは少なくともパイロット信号ＰＳから構成され、好ましくはさらに他の制御シンボルＣＳとともに構成される。例えば、各基地局ＢＳが同一周波数上で一定電力のパイロット信号ＰＳを送信することが可能である。加入者局ＭＳは受信したパイロット信号の電力レベルを監視することが可能であり、それから基地局ＢＳ及び加入者局ＭＳ間の接続上での電力ロスを推定する。パイロット信号強度を経路損失の推定に用い、経路損失が予め定められた経路損失閾値よりも大きい場合、加入者ハンドオーバ手段ＨＯＲＭは、ステップＳＴ１３においてトリガ信号ＩＦＴＳを出力する。

【００２１】

４番目に、「電力レベル超過」状態に関して、加入者ハンドオーバ手段及び／又はネットワークハンドオーバ手段は、ハンドオーバの必要性を、加入者電力調整モジュールＰＡＭ（図１において移動局ＭＳ内部に示す）が、基地局ＢＳからの電力増加コマンドに応答して、通信接続ＣＣのアップリンクでの電力をもはや増加できないことの監視に基づき判定するように適合される。

【００２２】

図５ａ－ｄは、複数のタイムスロットＴＳ１．．．ＴＳ１５からなるフレームＦＲを基地送受信局（一般にノード”Ｂ”と呼ばれる）ＲＢＳと、加入者局ＭＳ間で交換する際の送信電力に関する、これら従来の調整を示す。基地送受信局（ノード”Ｂ”）ＲＢＳ内の電力調整モジュールＰＡＭは、電力に対し上限閾値Ｐ

ＵＰ、下限閾値ＰＤＷＮ及びオフセット値ＰＯＦＦをプリセットする。ノードＢにおいて、電力オフセット値ＰＯＦＦは低速電力制御と共に用いられ、上限及び下限閾値ＰＵＰ、ＰＤＷＮは高速電力制御とともに用いられる。

【００２３】

図５ｂに示す低速電力制御及び高速電力制御は、図５ｃのフローチャートに従って実行される。低速電力制御（外部制御ループ）に関連するステップＰ１、Ｐ２はＲＮＣ側又はＭＳ側で実行される。ステップＰ１において、フレームエラー率ＦＥＲ（又はブロックエラー率ＢＬＥＲ）が測定され、ステップＰ２でこの測定されたＦＥＲ（又はＢＬＥＲ）がＦＥＲ目標値（又はＢＬＥＲ目標値）と比較される。ステップＰ８において、新たな信号干渉比目標値ＳＩＲ－ｔａｒｇｅｔが得られる。

【００２４】

図５ｄに示すように、delta_SIR_target値（ｄＢ）と測定されたＦＥＲ値の対数との間には、既知の（シミュレートされた）関係が存在する。２つの閾値UL_delta_SIR_2及びUL_delta_SIR_1の間には、所定の「ワーキングエリア」が存在する。この関係は既知、すなわち事前にシミュレートされる。図５ｄに示すように、測定値の対数（測定されたＦＥＲ）に依存して、delta_SIR_target*が読み出される。新たなSIR_target値SIR_targetは以下の式に従って計算される。

SIR_target=SIR_target+delta_SIR_target*

従って、外部ループ又は低速電力制御は、ステップＰ１，Ｐ２が実行される場合には常にステップＰ８において新たなSIR_target値を生成する。新たなSIR_target値はその後ノードＢ側もしくはＭＳ側でそれぞれ実行される高速電力制御（内部ループ）で用いられる。

【００２５】

ステップＰ５において、スロット当りのＳＩＲ（信号対干渉比）が測定され、ステップＰ４では、測定ＳＩＲ値がステップＰ８で取得されたような（現在の）ＳＩＲ目標値と比較される。もし、その測定ＳＩＲ値が現在のＳＩＲ目標値より大きいなら、減少命令が移動局ＭＳ／ネットワークに送信され、即ち、送信電力制御パラメータＴＰＣがステップＰ７においてＴＰＣ＝“００”にセットされる

。その測定ＳＩＲ値がステップＰ４における（現在の）ＳＩＲ目標値より小さいとき、増加命令が送信電力制御パラメータＴＰＣをＴＰＣ＝“１１”と設定することによりステップＰ６において移動局ＭＳ／ネットワークに送信される。

【００２６】

図５ｂに図示されているように、低速の電力制御と高速の電力制御とによってダウンリンクＤＬにおける電力P_{out}の段階的な調整という結果が得られる。低速の電力制御はフレーム（或いはブロック）毎にフレーム誤り率ＦＥＲ（或いはブロック誤り率ＢＬＥＲ）を計算するステップＰ１、Ｐ２を実行するので、新しいＳＩＲ－目標値は、各スロットに関してステップＰ５、Ｐ４、Ｐ６、及びＰ７で実行される高速の電力制御よりも低い頻度で得られる。

【００２７】

オフセット値P_{off}と高い側及び低い側の閾値P_{up}、P_{dwn}もまた、電力調整に用いられる。例えば、出力電力P_{out}の高い側の閾値P_{up}を超えるとき、オフセット値P_{off}はわずかに増加し、その電力が低い側の閾値P_{dwn}よりも小さいとき、オフセット値P_{off}はわずかに減少する。電力の段階的な調整は常にP_{dwn}とP_{up}との間の電力範囲の中で実行される。これらの値P_{off}、P_{up}、及びP_{dwn}はただソフトハンドオーバのきっかけのために用いられるので、これらは本発明とのこれ以上の関連はなく、これについてのこれ以上の説明はそれ故に省略される。

【００２８】

上述のように、４番目の「電力レベル超過」条件において、ノードＢ（基地局ＢＳ）は加入者局ＭＳに対してその電力を増加するように命令し、そして、ノードＢにおける電力調整モジュールＰＡＭが電力増加命令ＴＣＰに応答して電力のさらなる増加がないことを通知するなら、ネットワークハンドオーバ手段ＨＯＲＭはＩＦトリガ信号を発行することにより測定を要求しても良い。

【００２９】

上述の４つの異なる条件に関して、数多くの重大な不利益があり、４つの説明された条件のいくつかは、将来の広帯域符号分割多元接続のシステム（ＷＣＤＭＡ）において実施することさえもできない。

【００３０】

参考文献［１］はＩＳ－９５標準に関し、同期型ＣＤＭＡシステムを記述しているのに対し、参考文献［２］：ＴＳ２５．２０１　Ｖ２．１．０、第３世代パートナーシップ　プロジェクト（３ＧＰＰ）；技術仕様グループ（ＴＳＧ）；無線接続ネットワーク（ＲＡＭ；作業グループ１（ＷＧ１）；物理層－概観、１９９９年６月版は非同期型ＷＣＤＭＡシステム、特に、そこで用いられる多元接続を記述している。参考文献［１］において記載されているもののような同期型システムにおいて、基地局ＢＳ或いは加入者局ＭＳは依然として両者間の距離を評価できる（第２のトリガ条件）。このことはパイロットチャネルと全てのチャネルにおけるチップレートが精密なシステムクロックに同期される（ロックされる）ので可能である。このことは参考文献［１］においては、全地球測位システム（ＧＰＳ）を用いることにより達成される。しかしながら、基地局ＢＳと加入者局ＭＳとの間のマルチパス伝播遅延やシャドウイングのために、評価された距離は誤っているかもしれない。それ故に、第２の条件「距離制限超過」は非常に正確であるとは言えないかもしれない。

【００３１】

「パイロット強度が予め定められた閾値基準を下回る」という３番目の条件では、加入者局ＭＳはＩＦ測定のきっかけとなり、従ってハンドオーバのきっかけとなる測定を実行しなければならない。パイロット信号強度のこれら連続的な測定は、加入者局ＭＳが所定の測定時間の間はパイロットチャネルの平均フィルタリングを実行しなければならないので、加入者局の電池の寿命を著しく短くさせるかもしれない。電池寿命の減少は、加入者局によって実行されねばならない既に多くの測定、例えば、ＩＦ測定トリガ信号ＩＦＴＳが発行されたときの別の周波数におけるＩＦ測定などがあるので、全ての環境で回避されるべきものである。さらにその上、加入者局ＭＳは、エアインタフェースによって基地送受信局ＲＢＳ（ノードＢ）とネットワーク制御手段ＲＮＣとへ、ある形式でパイロット信号強度測定を報告しなければならず、そして、これはアップリンクＵＬにおける干渉レベルとネットワークにおける信号発信の負荷とをさらに増加させるであろう。それ故に、「パイロット強度が予め定められた閾値基準を下回る」という３番目の条件に関連して用いられるとき、「基地局トラフィック負荷超過」という

１番目の条件に従う負荷の評価は、ネットワークのエアインタフェースにおける信号発信の増大のため、より多くの信号発信の原因となるかもしれない。

【００３２】

それ故に、従来技術のトリガ機構の主要な不利益は、これらの条件のいくつかが同期型或いは非同期型のシステムでは用いられず、電池寿命が短くなり、アップリンクＵＬにおける干渉レベルとともにネットワークにおける信号発信の負荷が増大する点にある。

【００３３】

図２において、（加入者局ハンドオーバ手段ＨＯＲＭ或いはネットワークハンドオーバ手段ＨＯＲＭによって生成された）ＩＦ測定トリガ信号ＩＦＴＳに応答して、加入者局はステップＳＴ２１において与えられた時間間隔でＩＦ測定を実行する。上述のように、高速で信頼性のある周波数間ハンドオーバを実行するために、加入者局ＭＳに異なる周波数において信号品質測定を、例えば、ターゲットセル或いは異なるシステムにおいて実行させ、そして、加入者局ＭＳがどのセルにハンドオーバされることになるのかに関して、ネットワーク制御手段ＲＮＣがそのハンドオーバの決定をレポートされる信号品質測定に基礎をおくことができるようにネットワーク制御手段ＲＮＣにこれらのことをレポートする。

【００３４】

後述するように、加入者局ＭＳでのＩＦ測定の実行はささいなタスクではない。例えば、ＣＤＭＡやＦＤＭＡシステムにおいて、加入者局ＭＳの受信機は通常、現在の周波数で情報を受信するのにビジーであり、従って、ある測定時間がそのようなシステムでは、データの大きな損失なく周波数間測定を可能とするためにどうにかして作り出されねばならない。フィールド測定が実行される時間間隔を決定するための従来の方法について以下に、図３－１、図３－２、図４－１、図４－２、及び図６を参照して説明する。

【００３５】

図３－１を参照して既に上述したように、ＣＤＭＡ通信システムでは、データ通信は、複数の時間スロットＴＳ１.....ＴＳ１５から成るデータフレームＦＲを交換することによって実行される。各時間スロットは制御部ＣＰとデータ部Ｄ

Ｐとを有している。上述した参考文献［２］に記載されているように、また、図３－２のステップＳＴ２１’と図３－１にも示唆されているように、圧縮モード（スロットモードとも呼ばれる）でデータ伝送を実行してＩＦ測定についてのいくらかの時間を作り出すことも可能である。この目的のため、ネットワーク制御手段ＲＮＣは、データ部ＤＰに含まれるデータが圧縮される、即ち、フレームのより小さな部分へと集められ、その結果として待機時間部ＩＴＰを作り出す圧縮モード設定手段ＣＭＳＭを有している。加入者局ＭＳは、－ネットワーク制御手段ＲＮＣの圧縮モード設定手段ＣＭＳＭから送信される信号或いはある情報を介して圧縮モードでの送信について通知され－、圧縮モードでの動作を決定、即ち、具体化する圧縮モード決定手段ＣＭＤＭを有している。もし、そのような圧縮モードの動作が検出されたなら、加入者局ＭＳは圧縮モードでの動作に入り、図３－２におけるステップＳＴ２１’’で、待機時間ＩＴでＩＦ測定を実行する。

【００３６】

ＣＤＭＡシステムにおいて、そのような情報の集中は、処理利得Ｇ＝チップ／情報ビット＝１／ＳＦを低減する、例えば、拡散係数ＳＦを小さくすることにより達成される。どのように情報の集中が達成されるのかについての別の可能性はチャネル符号化方式を変更する、例えば、ｒ＝１／３からｒ＝１／２に変更することによってなされる。圧縮モードでの動作のために、ＩＦ測定が実行される時間間隔ＩＴは加入者局ＭＳのＩＦ測定手段ＩＦＭＭによって生成される。

【００３７】

図４－１とステップＳＣ２１’’’とＳＴ２１’’’’とはフィールド測定が実行される時間間隔がどのように備えられるのかについてのもう１つの可能性を示している。ＧＳＭシステムでは、複数のＴＤＭＡ時間スロットＴＳ１....ＴＳ－Ｍから成るフレームの特定の時間スロットＦＭＳが指定され、フィールド測定がＦＭＰ部において実行される。即ち、ＧＳＭシステムでは、ネットワーク制御手段或いは基地局の送信機から加入者局ＭＳへデータが送信されない所定のフィールド測定スロットが備えられる。

【００３８】

待機時間間隔がどのように備えられるのかについての更なるやり方は、システ

ム間ハンドオーバが実行されるべきである場合について、参考文献［１］に記載されている。この場合、図６に図示されているように、加入者局ＭＳは別のシステムで測定を実行しないし、その代わり、その別のシステムでは加入者局ＭＳが既に通信を行なっているのと同じ周波数で加入者局ＭＳによって受信される擬似雑音ＰＮシーケンスを送信する。他のＰＮシーケンスと比較して、このＰＮシーケンスの電力が所定の時間、所定の閾値を超えるとき、システム間ハンドオーバが実行される。

【００３９】

図２と図３－１と図４－１とに示されているように、ネットワーク制御手段ＲＮＣは移動局とステップＳＴ１３とにトリガを与えてＩＦ測定を実行し、そして、また前記ＩＦ測定が実行されることになる異なるセル或いは異なるシステムに属する周波数で加入者局ＭＳに指示を与える。加入者局ＳＳは所定の時間内でネットワーク制御手段ＲＮＣにＩＦ測定を報告する。それから、ステップＳＴ２２では、ネットワーク制御手段ＲＮＣは選択された周波数（セル或いは異なるシステム）にハンドオーバが可能であるかどうかを決定する。もし、例えば、あまりにも大きい干渉がその新しい周波数で決定されるために、それが不可能であるなら、ネットワーク制御手段はステップＳＴ２３において新しいターゲットセル（周波数）を選択し、ＩＦ測定がステップＳＴ２１において加入者局ＭＳによって繰り返される。さらにその上、ネットワーク制御手段ＲＮＣは加入者局ＭＳに命令を与えて周期的な探索或いは一回限りの探索を実行させることができる。そのような手順は、例えば、同期型通信システムについては参考文献［１］に記載されている。

【００４０】

ＣＤＭＡ２０００のようなあるシステムでは、加入者局ＭＳはＩＦ測定をネットワーク制御手段にレポートするだけではなく、ネットワーク制御手段ＲＮＣに対してどのくらい長く（時間的に）そしていつ（開始時間）加入者局ＭＳが所望のＩＦ測定を実行できるようになるかを示す。もし、ネットワーク制御手段ＲＮＣが、加入者局ＭＳがＩＦ測定の実行を意図している時間間隔についての知識をもっているならば、そのネットワーク制御手段ＲＮＣは、ネットワーク制御手段

ＲＮＣによって送信されるが、加入者局ＭＳではそのＩＦ測定を実行する時間間隔において処理を行なわないデータフレームを補償するためのいくつかの準備をすることができる。即ち、さらなる準備がなされないなら、加入者局ＭＳがフィールド測定を実行する時間間隔で、実際にデータフレームは失われるであろう。

【００４１】

１つの可能性とは、ネットワーク制御手段ＲＮＣがその測定時間間隔あるいは複数の測定時間間隔の前あるいは後に、電力を増すことである。その誤り率は常に複数のデータフレームにわたって評価されるのであるから、その測定時間間隔の前後におけるそのような電力増加により誤り率についての全体的な品質を、平均誤り率の要求を超えない平均的なレベルに保持することが可能になる。これに対して、類似の状態が加入者局ＭＳの側でも発生する。即ち、加入者局ＭＳがその測定時間間隔ではデータフレームを送信することはできないであろう。それ故に、加入者局ＭＳも、決定された測定時間の前後で電力を増加することにより可能な伝送されていないフレームを補償する。それ故に、加入者局ＭＳの側とネットワーク制御手段ＲＮＣの側で、受信品質は改善される。しかしながら、移動局ＭＳがフィールド測定をステップＳＴ２１で実行することになる与えられた時間間隔を備える上述の手順（これは一般にＣＤＭＡ２０００とＩＳ’９５で用いられる）、ＰＮシーケンス伝送、及び、電力増加による消去されたフレームの補償は依然として、以下に示すようにシステムで実施されるときにいくつかの大きな欠点を見せてしまう。

【００４２】

加えて、圧縮モードでの動作に関連するフィールド測定を実行するＷＣＤＭＡの手順は、特に、システムの場合には次のような不利益がある。もし、ダウンリンクＤＬにおける拡散係数ＳＦが、加入者局ＭＳが他のシステムについてのフィールド測定を実行することになる待機時間間隔ＩＴを備えるために小さくされるなら、利用可能なチャネル化コードは少なくなる。即ち、ＣＤＭＡシステムのハード的な能力は小さくなる。

【００４３】

これに対して、チャネル符号化率が一定時間大きくなるなら、ＣＤＭＡシステ

ムは異なる符号化方式と同じ無線リンクについて異なるインタリービングの深さとを用いてサービスを実行するので、複雑な符号速度の装置がネットワーク制御手段ＲＮＣに実装されねばならない。

【００４４】

さらにその上、加入者局ＭＳは、同じデータ情報がより短い時間間隔、即ち、圧縮データ期間で送信されるので、圧縮モードでの動作のために測定が実行されるとき、その出力電力を増加しなければならない。加入者局ＭＳ及び／又は基地送受信局ＲＢＳの出力電力が大きくされないなら、その性能は低下するであろう。しかしながら、加入者局ＭＳのピーク電力を増加するというこの要求は、もし加入者ＭＳが既にその最大出力電力で送信しているなら、距離の制限を示唆するかもしれない。さらにその上、符号化率が低くなるとき、データフィールドが同じ程度にまで保護されていないので、情報を損失するより大きな危険性がある。従って、一方で圧縮データ伝送が品質を低減する反面、ＩＦ測定の実施には長い時間が必要とされるので、待機時間間隔が非常に短く、ハンドオーバが低速になる。

【００４５】

図６に示されているように、ＰＮシーケンス伝送を用いる手順は次のような不利益がある。この場合、全ての他の存在する移動通信システムが加入者局ＭＳによって検出されるＰＮシーケンスを送信する装置を備えなければならない。このことは運用者にとって（従ってエンドユーザにとって）大きな費用を意味する。さらにその上、別の移動通信システムで用いられるＰＮシーケンスはＣＤＭＡシステムと干渉するであろうしデータ伝送の能力と品質とを低下させるであろう。

【００４６】

測定時間間隔の前後で電力を増加させるという最後に述べた方法は、加入者局ＭＳがセルの境界に近くおそらくは周波数間ハンドオーバを行いたいとき、或いは、セル（セクタ）が高負荷を呈するとき、通話品質が既に非常に低い場合には、測定時間間隔によるフレーム損失がその通話品質を劣化させてしまうであろうという高い危険性があるという不利益がある。

【００４７】

測定時間間隔は加入者局によって、ネットワーク制御手段からデータ送信の内時間として決定可能である。従って、ＩＦ測定は接続の品質低下の原因とは成り得ない。

【００４８】

上述の従来技術に従うＩＦ測定のために時間間隔を備える上記の不利益をまとめると、時間測定間隔のこのような備えは、（例えば、フレームの損失のため）サービス品質の低下という結果になり、（ＰＮシーケンス発生器の組み込みのために）複雑なシステム改造を必要としたり、（その時間間隔の前後で電力が増えるなら）加入者局ＭＳの電池寿命を短くしてしまうであろう。さらに、時間間隔は圧縮タイムスロット内の待機時間長によって制限される。

【００４９】

（発明の概要）

上述の通り、移動通信システムにおいてＩＦ測定をトリガ及び実行するための上述した手順は、加入者局ＭＳの電池寿命が（特定のトリガ方法使用により）削減され、データ伝送のサービス品質が（フレームの欠損により）悪化し、（ＰＮ系列生成手段の組み込みにより）システム構成が複雑になるため、一般に不利である。さらに、ＩＦ測定が圧縮モード動作中の待機時間間隔でのみ実行可能であるため、ハンドオーバの実行には長い時間が必要である。本発明は特に少なくとも最後に述べた欠点を回避することを目的とする。

【００５０】

特に、本発明の目的は、伝送品質を維持しながら、ＩＦ測定を容易にする加入者局、ネットワーク制御手段、方法及び、移動通信システムを提供することにある。

【００５１】

この目的は、少なくとも１つの基地送受信局及びネットワーク制御手段を有する移動通信システムの、周波数間ＩＦ測定を実行するように適合されたＩＦ測定手段とを含んだ加入者局（請求項１）であって、前記ネットワーク制御手段からの伝送内における、前記加入者局と前記基地送受信局との間に確立済みの接続の時間間隔を示すＩＦ測定時間間隔指示信号を検出する時間間隔信号検出手段を有

し、前記ＩＦ測定手段が前記ＩＦ測定を前記ＩＦ測定時間間隔指示信号に示される前記時間間隔で実行するように適合されていることを特徴とする加入者局によって解決される。

【００５２】

この目的はまた、少なくとも１つの基地送受信局及びネットワーク制御手段を有する移動通信システムの加入者局において周波数間ＩＦ測定を実施するための方法（請求項１３）であって、前記加入者局及び前記基地送受信局との間の接続中にネットワーク制御手段においてＩＦ測定時間間隔を選択し、前記ネットワーク制御手段から前記加入者局へ、前記加入者局によって前記ＩＦ測定がなされるべき前記接続の時間間隔を示すＩＦ測定時間間隔指示信号を送信するステップと、前記加入者局において前記ＩＦ測定時間間隔指示信号を検出するステップ及び、前記ＩＦ測定時間間隔指示信号によって示される前記接続の前記時間間隔で前記ＩＦ測定を前記加入者局において実施するステップを有することを特徴とする方法によっても解決される。

【００５３】

この目的はまた、周波数間ＩＦ測定を実施するように適合されたＩＦ測定手段を有する、少なくとも１つの加入者局と、少なくとも１つの基地送受信局及び、接続中に前記加入者局とデータ伝送を行うためのネットワーク制御手段とを有する移動通信システム（請求項３３）であって、前記ネットワーク制御手段が前記加入者局がＩＦ測定を行うべき前記接続の時間間隔を選択し、前記加入者局に前記時間間隔を示すＩＦ測定時間間隔指示信号を送信するように適合されたＩＦ測定時間間隔選択手段を有し、前記加入者局が、前記ネットワーク制御手段からの伝送内で前記時間間隔を示す前記ＩＦ測定時間間隔指示信号を検出するように適合された時間間隔信号検出手段を有し、前記ＩＦ測定手段が、前記ＩＦ測定を、前記検出したＩＦ測定時間間隔指示信号で示される前記時間間隔で行うように適合されていることを特徴とする移動通信システムによっても解決される。

【００５４】

この目的はまた、少なくとも加入者局と少なくとも１つの基地送受信局との間で確立された通信接続上のデータ伝送を制御するための、移動通信システムのネ

ットワーク制御手段（請求項４４）であって、前記加入者局が測定を実行すべき接続の時間間隔を選択するように適合されるとともに、前記加入者局にＩＦ測定時間間隔指示信号を送信するように適合されたＩＦ測定時間間隔選択手段とを有することを特徴とするネットワーク制御手段によっても解決される。

【００５５】

本発明の第１の見地によれば、ネットワーク制御手段が、前記加入者局がＩＦ測定を実行すべき前記チャネルの予め定められた時間間隔を選択するＩＦ選択手段を有する。この選択された予め定められた時間間隔はその加入者局への予め定められた選択された時間間隔を示すＩＦ測定時間間隔指示信号中で加入者局に送信される。

【００５６】

加入者局はネットワーク制御手段からの伝送内で前記ＩＦ測定時間間隔指示信号を検出するために時間間隔信号検出手段を有する。その後ＩＦ測定が加入者局によって、ネットワーク制御手段において選択された予め定められた時間間隔で実行される。従って、ネットワークは加入者局にいつ、及びどれくらいの期間加入者局が別の周波数上で測定を行うのかを示すことが可能である。

すなわち、ＩＦ測定時間間隔指示信号は開始タイミング及び、加入者局においてＩＦ測定を行うべき時間間隔の長さを指定する。この選択された時間間隔において、加入者局はネットワーク制御手段が供給する、一時的な伝送品質の劣化は許容可能であるか、補償可能で、その後補償されるとネットワーク制御手段が既に判定した時間間隔を基にできるため、起こりうる伝送品質の劣化、例えばデータの欠損に関して気にする必要はない。

【００５７】

本発明の第２の見地によれば、加入者局及び／又は基地送受信局は、確立された通信接続上のサービス品質を監視し、そのサービス品質の情報を前記ネットワーク制御手段に送信するように適合された接続品質監視手段を有する。そのような場合、ネットワーク制御手段は前記通信接続の前記予め定められた時間間隔を、接続品質監視手段から報告されたサービス品質の情報に基づいて選択する。時間間隔は、前記ＩＦ測定手段が前記ＩＦ測定を実施することに起因したサービス

品質の一時的な劣化が許される時間間隔となるべく選択される。そのような手順の長所はもちろん、加入者局が実際にＩＦ測定をこの時間間隔で実行した場合には、加入者局への時間間隔の指示が常に送信状態の劣化原因となるであろうことをネットワーク制御手段が事前に知っていることである。しかし、ネットワーク制御手段が、一時的な品質劣化が許容可能である時間間隔を指示したことを確認した場合、その後ネットワーク制御手段は、この品質劣化を相殺するための準備をこの選択された時間間隔内に行うことが可能である。

【００５８】

本発明の第３の見地によれば、遅延に敏感なデータ伝送が前記確立された接続上の基地送受信局及び加入者局間において実施される。遅延に敏感なデータ伝送中にＩＦ測定が実行される場合、これは接続上のフレームのデータスロット（フレームの一部）が失われること、すなわちサービス品質の悪化を暗示する。しかしこの品質悪化は加入者局及びネットワーク制御手段が、前記予め定められた時間間隔の開始前及び／又は前記時間間隔の終了後に、通信接続のダウンリンク及びアップリングの伝送電力をそれぞれ増加するように電力調整手段に指示する場合には相殺可能である。すなわち、ＩＦ測定が実行される時間間隔においては遅延に敏感なデータ伝送において常にデータの損失が発生するけれども、都合の良いことに平均エラー率は同一に保たれる。

【００５９】

本発明の第４の見地によれば、欠損に敏感なデータ伝送が基地送受信局及び加入者局間で実施される。接続サービスの欠損に敏感なタイプの間、ネットワーク及び加入者局間での情報の流れは通常あまり密でなく、その接続中にネットワーク側で用いられるバッファは指定された閾値未満である。そのような場合、ネットワークは、送信バッファ手段が送信データによって完全に満たされないような時間間隔において、加入者局に対し他の周波数／システム上で測定を実施するように要求することが可能である。

【００６０】

すなわち、加入者局のＩＦ測定手段によって前記ＩＦ測定手段が実行される前記選択された前記選択された時間間隔において、ネットワーク中の送信バッファは

少なくとも前記時間間隔中に送信されるべき前記伝送データの一部を一時的に格納することが可能である。データの損失が発生しないよう、時間間隔の終了後、さらに格納されるデータ（タイムスロット、例えばＧＳＭでのタイムスロット又はＷＣＤＭＡのデータフレーム）が加入者局へ送信される。

【００６１】

本発明の第５の見地によれば、損失に敏感な形式の接続サービスに関する送信バッファ手段の利用とともに、ネットワーク制御手段は時間間隔中データ伝送速度を落とし、前記時間間隔が終了した後、データ伝送速度を再び増加させるように適合される。そのようにすることで、データが到達する速度が削減されるため、バッファ手段が急速に満たされることが回避される。

【００６２】

本発明の第６の見地によれば、第４及び第５の見地による送信バッファ手段の利用と共に、ネットワーク制御手段が伝送データの中間記憶の容量を増加させるため、他のバッファ手段を用いて再スケジューリングを実施することが可能である。一時的に、送信バッファ手段のバッファサイズを増加させ、時間間隔中に用いられない他のバッファ手段のバッファサイズを減少させるために、他のバッファを用いた動的なバッファスケジューリングを行うことも可能である。送信バッファサイズを増加させるためにバッファ再スケジューリングも動的バッファスケジュール管理も行わない場合に限り、最後にネットワーク制御手段の削除手段が前記時間間隔中に送信されるべきデータの少なくとも１部を削除する。

【００６３】

本発明の第７の見地によれば、データの一部がタイムスロット中に圧縮される圧縮モード動作で基地送受信局及び加入者局の間のデータ伝送が実行される。そして、好ましくはＩＦ測定時間間隔指示信号に示された時間間隔で、かつデータ伝送が圧縮モードで実行されるデータフレームの待機時間部分においてＩＦ測定が実施される。従って、この場合ネットワークは加入者局に、いつ、どれくらいの長さ加入者局が他の周波数の測定を行うべきかを要請する。これは圧縮モードの補完として使用可能である。

【００６４】

本発明の別の有利な実施例及び改良点は従属請求項から得られるであろう。さらに、本発明は本明細書及び／又は添付の請求項において個々に記述及び／又はクレームされている見地及び特徴の組み合わせから得られる実施例を包含可能である。

【００６５】

以下、本発明の実施例を添付図面を参照して説明する。

ここで、図面を通じて同一又は類似の参照数字は同一又は類似のステップ及び機能を示すことに留意されたい。特に、図２における従来の加入者局ＭＳ及び従来のネットワーク制御手段ＲＮＣに対して説明された各部は本発明の実施例においてもまた存在する。さらに、本発明は上述した特定のＣＤＭＡ、ＷＣＤＭＡ、Ｄ－ＡＭＰＳ又はＧＳＭシステムに限定されないことに留意されたい。換言すれば、本発明は、周波数、セル及び異なるシステム間でハンドオーバを実施する必要のある任意の電気通信システムに適用可能である。

【００６６】

（発明の原理）

ハンドオーバ手順及びＩＦ測定は通信システムＣＣの設定時又は、単に非アクティブモード動作中の移動局ＭＳとシグナリング接続が設定された際の両方において行われることに留意されたい。

【００６７】

図７は本発明による移動通信システムＴ１の基本的なブロック図を示す。移動局ＭＳは、従来例による図１において既に示された各部に加え、ネットワーク制御手段ＲＮＣからの伝送中で予め定められた時間間隔を示すＩＦ測定時間間隔指示信号ＴＩＩＳを検出するように適合された時間間隔信号検出手段ＴＳＩＤＭを有する。ネットワーク制御手段ＲＮＣは、前記加入者局ＭＳが前記ＩＦ測定を行うべき前記接続の、前記予め定められた時間間隔を選択するように適合されたＩＦ測定時間間隔選択手段ＴＩＳＭを有する。図７に示すように、時間間隔選択手段ＴＩＳＭは前記加入者局ＭＳに、前記ＩＦ測定時間間隔指示信号ＴＩＩＳを送信する。

【００６８】

従って、ネットワーク制御手段ＲＮＣ内の時間間隔選択手段ＴＩＳＭ及び加入者局ＭＳ内の時間間隔信号検出手段ＴＳＩＤＭを用いることにより、ネットワーク制御手段ＲＮＣから加入者局ＭＳへ時間間隔を指定することが可能である。そのため、加入者局ＭＳは自ら何らかの判定を行う必要がなく、時間間隔が適切であることをネットワーク制御手段からの指示に基づいて完全に信頼することができる。

【００６９】

図８に示すように、基本的にＩＦ測定手段は、図８のステップＳＴ１３において、加入者局ＭＳ又はネットワーク制御手段ＲＮＣ内のハンドオーバ手段ＨＯＲＭが生成するＩＦ測定トリガ信号ＩＦＴＳに応答して前記ＩＦ測定を行うように適合されている。ステップＳ２１１において、ネットワーク制御手段ＲＮＣは、ＩＦ測定が実行されるべき時間間隔であり、ネットワーク制御手段ＲＮＣが一時的な品質劣化を許容可能であることを決定する時間間隔を決定する。この時間間隔はステップＳＴ２１１において移動局ＭＳへ送信される。

【００７０】

ステップＳＴ２１２において、ＩＦ測定手段ＩＦＭＭは、前記検出された、ネットワーク制御手段から送信されたＩＦ測定時間間隔指示信号ＴＩＩＳ中に指示された前記予め定められた時間間隔で前記ＩＦ測定を実行する。図８における他のステップは図２と同一である。

【００７１】

圧縮モード動作に関する従来例に関して説明したように、圧縮モード動作においては短い待機時間間隔ＩＦのみがＩＦフィールド測定の実行に利用可能である。しかし、本発明の原理によれば、一時的な品質劣化が許容可能な計画的な時間間隔が使用される。ネットワーク制御手段が、ＩＦ測定が実施された場合でも、一定の品質劣化が受け入れられるか、ネットワーク制御手段又は加入者局によって補償可能なよう、適切な時間間隔を決定したことを、加入者局が完全に信頼することが可能であるため、加入者局は、この時間間隔の指示を受信した際、直ちにＩＦ測定を開始可能である。すなわち、加入者局がＩＦ測定を実施する時間間隔中は加入者局及びネットワーク間でのデータ交換は不可能なため、ＩＦ測定に

起因したサービス品質の一時的な低下が発生する。

【００７２】

しかし、ネットワーク制御手段はそのようなサービス品質の低下が全体の伝送に弊害をもたらさない時間間隔を自律的に決定することが可能である。通常、ネットワーク制御手段によって指示される時間間隔は圧縮モード動作における待機時間間隔以下である。加入者は圧縮モード動作の開始を待つ必要はないため、ＩＦ測定を早めに実行することが可能であり、従ってより高速な周波数間又はシステム間ハンドオーバ決定を行うことが可能である。これは、加入者局が、提案された方法を使用する際、圧縮モード技術のみを用いた測定実行の他に、測定を実行する能力を有しているからである。すなわち、いくつかの状況において、接続を失わないように決定を早く行うことが困難である。そのため、伝送が中断されるほど品質劣化がひどくない限りはＩＦ測定を依然として直ちに実行可能であり、その結果、より高速なハンドオーバが達成される。

【００７３】

好ましくは、ＩＦ測定時間間隔指示信号ＴＩＩＳが前記ＩＦ測定時間間隔選択手段ＴＩＳＭからの前記ＩＦ測定トリガ信号ＩＦＴＳ内で送信される。すなわち、ハンドオーバの必要性があること及び、加入者局がＩＦ測定のトリガを必要としていることを、まずネットワーク制御手段ＲＮＣが基本的に決定することが可能である。しかし、ネットワーク制御手段ＲＮＣはＩＦ測定が実行されるべき時間間隔が決定されるまで、トリガ信号の送信を保留することができる。そして、トリガ信号及び時間間隔の指示の両方が共に加入者局へ送信可能になり、例えばＩＦ測定トリガ信号が選択された時間間隔に関する情報をも搬送することが可能である。

【００７４】

従って、ネットワークが、加入者局がいつ、どの期間（又はどの複数期間）に、同一システム又は他のシステム内の別の周波数の測定を行うべきかについて決定した時点で、加入者局は現在の（単数又は複数の）サービスのサービス品質（ＱｏＳ）が一時的に低下したとしても、これら測定を実施する能力を有する。

【００７５】

時間間隔の適切な決定を可能にするため、ネットワーク制御手段ＲＮＣ（及び／又は加入者局ＭＳ）は確立された通信接続のサービス品質ＱｏＳを監視し、サービス品質ＱｏＳの情報をネットワーク制御手段ＲＮＣに送信するように適合された接続品質測定手段ＣＱＭＭを有することが可能である。接続品質監視手段ＣＱＭＭはまた、基地送受信局ＲＢＳ内に配置されても良い。接続品質監視手段ＣＱＭＭはサービス品質のいくらかの情報を時間間隔選択手段ＴＩＳＭに供給する。従って、時間間隔は前記ＩＦ測定手段ＩＦＭＭが前記ＩＦ測定を実行することによるサービス品質の一時的な低下が許される時間間隔となるべく選択されることが可能である。

【００７６】

従って、上述の通り、通信接続におけるサービス品質ＱｏＳの一時的な低下が許される場合、加入者局ＭＳはこのサービスの劣化を周波数間測定に用いることができる。ネットワークはサービス品質ＱｏＳの低下が許される１つ又は複数の時間間隔を決定し、その時間間隔において周波数間測定を行うことができる。ネットワーク制御手段はアップリンク及びダウンリンクの両方についての接続品質のみならず、システム構成についても知見を有する。そのため、ネットワーク制御手段は、加入者局が別の周波数についての測定を行うべきか否か、いつ、どれくらいの長さ測定すべきかについてを決定するための最良の可能性を有している。もちろん、接続品質が良好で、測定を行う他の周波数又はシステムが存在しない場合には、加入者局ＭＳがハンドオーバを実施する必要はない。

【００７７】

もちろん、本発明の原理は、ネットワーク制御手段が、検出されたＩＦ測定時間指示信号ＴＩＩＳを介して、いつ、どの（１つ又は複数の）間隔において加入者局ＭＳが周波数間測定を行うべきかを指示することを必要とする。また、上述したように、この情報はトリガ信号内に含まれても良い。

【００７８】

接続品質監視手段ＣＱＭＭはサービス品質の情報をネットワーク制御手段に送信する。さらに、接続品質監視手段ＣＱＭＭはネットワーク中でその接続に使用される未使用バッファの情報をも送信可能である。すなわち、いかなる通信シス

テムにおいても、加入者局に送信される前に送信データを一時的に格納する送信バッファが用いられる。（加入者局及び／又は基地送受信局及び／又はネットワーク制御手段に配置された）接続品質監視手段ＣＱＭＭはまた、加入者局が接続を確立した領域内のそのシステム及び他のシステム内の他の周波数等のシステム構成の知見を有する。従って、この情報全てに基づいて、時間間隔選択手段ＴＩＳＭは伝送品質の一時的な低下が依然として許容可能な最良の時間間隔を選択することができる。

【００７９】

本発明の実施例を参照して以下に説明するように、ネットワーク制御手段はＩＦ測定に起因する伝送の一時的劣化を相殺するための準備、例えば時間間隔の開始時又は終了時の電力増加を行うことが可能である。代わりに、（バッファサイズを増加するか、追加のバッファを用いることにより）送信バッファサイズを調整することもでき、さらに、到来するデータ量を削減し、送信バッファに格納する必要のあるデータ量を削減するために、予め定められた時間間隔において伝送レートを低下させることも可能である。

【００８０】

（第１の実施例）

一般に、通信システムにおいては、異なる形式のサービス、すなわち、遅延に敏感なサービス又は欠損に敏感なサービスに区別することができる。サービス形式が遅延に敏感である場合、伝送された情報が時間通りに受信されることが、誤り無しであることよりもある意味最も重要である。例えば、音声は遅延に敏感な伝送である。

【００８１】

他方、サービス形式が欠損に敏感である場合、加入者局又はネットワーク制御手段内の復号化器が訂正可能な誤りを超えずに情報が受信されることが重要である。パケットが回復不能な誤りを含んでいる場合、そのパケットは失われたものとして翻訳される。例えば、ウエブブラウズは情報が早く到達しようが遅く到達しようが関係ないため、欠損に敏感なサービスである。

【００８２】

本発明の第１実施例は、遅延に敏感なサービスの場合に対する周波数間測定に使用可能なサービス品質ＱｏＳの最小化又は削減をどのようにして行うかに関する。

【００８３】

加入者局ＭＳ及び基地送受信局ＲＢＳ間（又はネットワーク制御手段ＲＮＣ）の通信接続中に遅延に敏感な伝送が実施される場合、加入者局は基地送受信局ＲＢＳから前記選択された時間間隔中に到達したデータを削除する削除手段ＤＥＬを有する。そのような状況は例えば、ネットワーク制御手段ＲＮＣが加入者局ＭＳにいくつかの基準（例えば高いフレーム誤り率及び／又は移動局による不良測定レポート及び／又は低い受信信号強度及び／又は悪い信号対干渉比ＳＩＲ）に起因する特定の時間及び期間、加入者局ＭＳに他の周波数又はシステムについての測定を行うように要求し、かつ加入者局ＳＳ及び基地送受信局ＲＢＳが音声接続、すなわち遅延に敏感なサービスを確立した場合に発生する。これは、現在の接続上でのスロット（フレームのパス）又はフレームの損失をおそらく暗示するであろう。なぜならそのようなフレームは、ＩＦ測定が実行される時間間隔において加入者局によって削除される必要があるからである。このサービス品質の一時的な低下を相殺するため、前記ネットワーク制御手段ＲＮＣ及び／又は前記加入者局ＭＳはそれぞれ、前記予め定められた時間間隔の開始前及び／又は終了後に、通信接続ＣＣのダウンリンクＤＬ及びアップリンクＵＬ上の伝送電力をそれぞれ増加するための電力制御手段ＰＡＭを有することができる。

【００８４】

例えば、予め定められた時に、ネットワーク制御手段ＲＮＣは１０データフレーム後に前記加入者局ＭＳがＩＦ測定を行うべきであると決定し、アップリンク上の伝送電力を次の１０データフレームの間増加させるため、（例えば、送信制御フラグＴＣＰを用いる手順において）指示信号を加入者局ＭＳへ送信可能である。ネットワーク制御手段はまた、自らのダウンリンクＤＬ上の伝送電力を増加させる。

【００８５】

同時に、ネットワーク制御手段は加入者局ＭＳに、指示された時間間隔の終了

後、その伝送電力を複数のデータフレーム（例えば１０）について増加させるように指示する。同様に、時間間隔が終了した際、ネットワーク制御手段はまた自らのダウンリンク上の伝送電力を増加させる。そのような電力調整は、図５に関して上述した高速及び低速電力制御サイクルにおいて実施することができる。

【００８６】

もちろん、アップリンク及びダウンリンク上での伝送電力が時間間隔の前後において増加されたとしても、加入者局ＭＳはＩＦ測定を行うのに忙しいため、依然としてその時間間隔内部にはデータが送信又は受信されない期間が存在する。従って、基本的に誤り率は増加する。しかし、この誤り率の上昇は送信電力の増加によって埋め合わせできる。それは、誤り率は単に多数のデータフレームの平均について計算されるに過ぎない。従って、ＩＦ測定時間間隔の間の伝送品質の劣化は、時間間隔の最初又は最後において、送信電力を増加させることで埋め合わせ可能である。従って、サービス品質の全体的な低下は起こらない。

【００８７】

（第２の実施例）

本発明の第２の実施例によれば、基地送受信局ＲＢＳと加入者局ＭＳとの間で損失に敏感なデータ伝送が行われる際、周波数間測定の間サービス品質の低下最小化が実施される。

【００８８】

図７に示すように、ネットワーク及び／又はネットワーク制御手段ＲＮＣにおいては、送信データが前記通信接続のダウンリンク上で送信される前の中間記憶用に、所定サイズの送信バッファ手段ＢＵＦが常に用いられる。接続サービス形式が損失に敏感な形式の場合、ネットワーク制御手段ＲＮＣと加入者局ＭＳとの間の情報フローは密でなく、その接続の間用いられる送信バッファ手段ＢＵＦは通常指定された閾値に達しない。従って、ネットワーク制御手段ＲＮＣは加入者局ＭＳに所定の時間間隔において他の周波数／システムの測定を行うよう要求可能であり、ネットワーク／加入者局が指定された時間間隔の間、もっと多い情報を送信／受信する場合には、送信バッファＢＵＦがその時間間隔の間に送信すべき前記送信データの少なくとも一部を一時的に記憶する。ネットワーク制御手段

ＲＮＣは前記選択された時間間隔の終了後、格納されたデータを加入者局ＭＳに送信する。すなわち、この場合ネットワーク制御手段又は加入者局は、送信データの中間記憶のために、送信バッファ手段ＢＵＦの予備のバッファ空間を使用できる。

【００８９】

従って、サービスが損失に敏感な場合、すなわち失われるデータがあってはならない。いかなる場合も、選択されたＩＦ測定時間間隔の間の、加入者局とネットワーク制御手段（基地送受信局）の間のデータ伝送には意味がないため、ネットワーク制御手段は単にデータ送信を遅らせ、送信バッファ手段ＢＵＦに中間記憶を実行する。

【００９０】

代わりに、所定の時間間隔の間の一時的なサービス品質低下を、その時間間隔の前後で伝送速度を変えることにより補償することができる。すなわち、前記ＩＦ測定が前記ＩＦ測定手段ＩＦＭＭによって行われる前記時間間隔において、送信データが前記通信接続のダウンリンクＤＬ上で送信される前の中間記憶用に、所定サイズの送信バッファ手段ＢＵＦが用いられ、ネットワーク制御手段ＲＮＣ及び／又は加入者局ＭＳがデータ伝送速度を低下させると共に、前記時間間隔の終了後に再びデータ伝送速度を上昇させる。ネットワーク制御手段ＲＮＣ内の変速手段は通信接続のための伝送速度変更を処理する。

【００９１】

代わりに、ネットワーク制御手段（又は基地送受信局ＲＢＳ）が、現在の送信バッファ手段ＢＵＦに直ちに処理（格納）されることの可能なさらなる送信データを送信／受信する場合が起こりうる。そのような場合、ネットワーク制御手段は、他の追加送信バッファ手段ＢＵＦ’を用いてバッファサイズの再スケジュールを実行することができる。すなわち、ネットワーク制御手段ＲＮＣは選択された時間間隔の間に加入者局へ送信される／から受信されることのできない送信データの中間記憶のために、より多い記憶容量を提供するよう、他のバッファ手段ＢＵＦ’を用いて再スケジュールを行うように適合される。すなわち、追加バッファ手段ＢＵＦ’もまた、ＩＦ測定を実行するための時間間隔の間に失われるこ

とがあってはならない送信データの格納に用いられる。

【００９２】

さらに、その時間間隔において、前記送信バッファ手段ＢＵＦのバッファサイズを増加させ、もう一方のバッファ手段ＢＵＦ’のバッファサイズを減少させるため、ネットワーク制御手段ＲＮＣが他のバッファ手段ＢＵＦ’を用いて動的なバッファスケジュールを実行することも可能である。すなわち、前記選択された時間間隔の間用いられないいくつかのバッファ手段ＢＵＦ、ＢＵＦ’をデータの中間記憶に用いることができる。従って、いかなるデータも失われず、前記時間間隔の終了後に加入者局／基地送受信局に送信することが可能である。

【００９３】

ネットワーク／加入者局が、データフローの高いピークに対処するため、データを廃棄する場合もある。すなわち、全バッファ手段ＢＵＦ、ＢＵＦ’の記憶容量が完全に使い尽くされると、前記時間間隔内に送信されるべきデータの少なくとも一部を削除する以外の選択肢が無い。従って、加入者局ＭＳ及び／又はネットワーク制御手段ＲＮＣは送信されるべきデータの少なくとも一部を削除するための手段を有する。

【００９４】

もちろん、ネットワーク制御手段／加入者局のバッファサイズは、このネットワークが加入者局ＭＳに別の周波数／システム上で測定を実行するよう命令可能になる前に、特定の閾値を下回らねばならない。すなわち、通常使用されるバッファが既に満杯な場合、所定の時間間隔の間送信できない送信データをさらに保留するチャンスは無い。バッファサイズは所定の閾値を下回っていても、ネットワーク内のバッファがオーバフローするであろうようなデータ量の急増が起こるかもしれない。そのような場合、別のバッファ手段ＢＵＦ’を用いた、余ったバッファスペースの動的割り当てが行われる。これは、各バッファがどの程度満たされているかをネットワーク制御手段ＲＮＣが知っており、バッファサイズを必要に応じて再割り当て可能であるが故に実現できる。

【００９５】

上述の通り、本発明の第１及び第２の実施例によれば、前記加入者局がＩＦ測

定を行い、加入者局及びネットワークの間でのデータ送信／受信が不可能なため、ネットワーク制御手段ＲＮＣは、通信接続のサービス品質低下が実行されるものとして所定の時間間隔を選択する。

【００９６】

しかし、ネットワーク制御手段はいつ時間間隔が発生するかを知っているため、全体のサービス品質を再び向上させるための準備を行うことが可能である。これは遅延に敏感なデータ伝送（第１実施例）及び欠損に敏感なデータ伝送（第２実施例）の両方の場合に実施可能である。すなわち、ＩＦ測定が長期の時間間隔において実行されるという事実にもかかわらず、サービス品質ＱｏＳの低下を抑圧するための周波数間測定期間前後の伝送電力増加、動的バッファ再割り当て及び変速手順の全てが、サービス品質を平均的に向上させるために用いられる。

【００９７】

以下、フロー制御が行われる本発明の第３の実施例について説明する。

（第３の実施例）

本発明の第３の実施例によれば、ネットワーク制御手段はサービス品質を許容できるレベルに維持するために、電力の増加、再割り当て又は変速機構のいずれも用いない。

【００９８】

本発明の第３の実施例によれば、ＩＦハンドオーバ手段ＨＯＲＭは送信されたデータフレーム及び受信されたデータフレーム間の比ＲＦを判定し、その判定にかかった時間を測定するように適合された伝送比判定手段ＴＲＤＭと通信する。この比が特定のレベルに達した際、ネットワークは加入者局ＭＳに他の周波数／システム上で測定を行うように指示することが可能になる。しかし、この必要条件は、加入者局ＭＳに測定の実行を指示するには不十分であるかもしれない。

【００９９】

例えば、比が特定のレベルに達した際、ネットワークは、現在使用している送信バッファ手段ＢＵＦが常に、時間間隔の終了後に送信すべきデータを一時的に（時間間隔の間）格納可能である程度にデータ伝送速度が低いと間違いなく仮定することができる。ネットワーク制御手段ＲＮＣはこれを動的バッファ割り当て

と組み合わせることができる。例えば、ネットワーク制御手段ＲＮＣが、送信比（及び／又は受信比）が所定の閾値を超えたことを検出した場合、これは現在使用されている送信バッファ手段が所定の時間間隔における全ての送信データを一時的に格納することができなくなるであろうことを常に意味する。従って、送信／受信比の超過を検出したらすぐに、ネットワーク制御手段ＲＮＣは、ネットワーク制御手段ＲＮＣ内の他のバッファ手段ＢＵＦ’を用いて、利用可能なバッファサイズの再スケジュールを自動的に実行する。

【０１００】

ネットワーク制御手段はまた、これを時間間隔内の送信速度変更と組み合わせることができる。大きな送信／受信比が存在する場合であっても、ネットワーク制御手段ＲＮＣは最初に時間間隔における送信速度を減少させるように決定し、これでもバッファ手段内に全データを一時保存するには不十分である場合、他のバッファ手段を用いた再スケジュールをさらに行うことも可能である。

【０１０１】

従って、損失に敏感なデータ伝送の場合、ネットワーク制御手段はまた、時間間隔の間に送信することができず、サービス品質を低下させうるデータフレームの補償を常に実行することも可能である。

【０１０２】

（第４の実施例）

本発明の第４の実施例によれば、ＩＦ測定を選択可能な時間間隔が本発明の原理及び／又は第１、第２又は第３の実施例に従って決定される。すなわち、時間間隔はネットワーク制御手段によって予め指定され、加入者局ＭＳに送信される。サービス品質の一時的な悪化は、（損失に敏感であるか、遅延に敏感であるデータ伝送の場合とは異なり）加入者局及びネットワーク制御手段でなされる対策によって補償される。

【０１０３】

本発明の第４の実施例によれば、基地送受信局ＲＢＳ及び加入者局ＭＳの間におけるデータ伝送は、圧縮モード動作でデータフレームＦＲを送信することにより実施可能である。上述したように、圧縮モード動作において、データはタイム

スロット中に圧縮され、加入者局ＭＳ内の圧縮モード判定手段ＣＤＤＭはこの圧縮モード動作を検出可能である。本発明の第４の実施例において、ＩＦ測定は、ＩＦ測定時間間隔指示信号ＩＴＴＳで指示される複数のタイムスロット（又はデータフレーム）及び、圧縮モードでデータ伝送が実行されるデータフレームの複数の待機時間部分で実施可能である。すなわち、本発明の第４の実施例によれば、ネットワークが加入者局ＭＳに、いつ、そしてどれくらいの長さ他の周波数じょうで測定を実行すべきかについて通知し、これが圧縮モードを補完するものとして用いられる。

【０１０４】

すなわち、圧縮モード動作が検出された後、待機時間部分においてまずＩＦ測定が行われ、その後ネットワーク制御手段ＲＮＣからの指示通りＩＦ測定が所定時間間隔において継続される。これはまた逆に、すなわち、まずＩＦ測定が所定時間間隔において開始され、圧縮モード動作が検出されると直ちに待機時間が追加として、又は時間間隔の代わりに用いられるように実施することも可能である。

【０１０５】

最悪の場合、電力増加（第１の実施例）、バッファ空間割り当て又は再スケジュール、及び速度適応（第２の実施例）及び伝送比判定（第３の実施例）にもかかわらず、ネットワークが送信データの一時的な保持に十分なバッファスペースを持たない場合、ネットワーク中の全バッファが満杯になり、それ以上の超過データはネットワーク内で廃棄されるであろう。しかし、通常バッファは完全に満たされることはなく、少量のデータが廃棄されるに過ぎず、再度補償することが不可能なサービス品質の悪化は少量である。

【０１０６】

（産業上の利用性）

上述したとおり、上述した本発明の原理及び第１乃至第４の実施形態に係る技術は、圧縮モード動作では必ずサービス品質の悪化を受け入れなくてはならないという従来技術の問題点を回避する。すなわち、本発明による移動通信システムでは、計画的なサービス品質の低下は許容されるが、いつサービス品質の悪化が

発生するかがネットワーク内で既知であるため、サービス品質悪化が補償できるよう、対策を施すことが可能である。従って、サービス品質の悪化は発生しない。

【０１０７】

そのような手順は任意の移動通信システムにおいて利用可能であり、いかなる特定の規格にも制限されない。従って、本発明はＧＳＭシステム、ＷＣＤＭＡ又はＣＤＭＡシステムで用いることができる。さらに、本発明は本明細書において説明された特定の例及び実施例には制限されない。熟練者は本発明のさらなる実施例、変形物及び派生物を、ここに開示した技術に基づいて工夫することが可能である。上述した実施例は、現在発明者が考えるように、単に本発明の好ましい態様を構成するに過ぎない。

【０１０８】

さらに、上述の通り、本発明は、本明細書において独立して説明された機能及び／又は特許請求の範囲において別個に請求された請求項の機能から構成される実施例を含むことができる。

請求範囲における参照数字は、単に説明目的でのみ役目を果たし、保護範囲を限定するものではない。

【図面の簡単な説明】

【図１】

少なくとも２つの異なる移動通信システムＴ１，Ｔ２を有する従来の電気通信システムＴＥＬＥの一般的な概観を示す図である。

【図２】

図１に示す電気通信システムＴＥＬＥにおける周波数間及び／又はシステム間ハンドオーバを行うためのフローチャートである。

【図３－１】

圧縮モード動作が使用される際のデータフレーム及びタイムスロットの構成を示す図である。

【図３－２】

図３－１に示す圧縮モード動作が使用される際の、図２と同様のフローチャー

トである。

【図４－１】

ＧＳＭ等、従来のＴＤＭＡ移動通信システムにおける、フィールド測定タイムスロットの規定を示す図である。

【図４－２】

図４－１に示すような特定のフィールド測定タイムスロットにおいてフィールド測定が行われる場合の、図３－２と同様のフローチャートである。

【図５ａ】

加入者局ＭＳ及びノードＢ（基地送受信局ＲＢＳ）間の従来の電力調整手順を示す図である。

【図５ｂ】

ダウンリンクＤＬ出力の段階的調整を示す図である。

【図５ｃ】

図５ｂにおける出力の段階的変化の結果として得られる低速電力制御及び高速電力制御を示す図である。

【図５ｄ】

測定フレームエラー率ＦＥＲ又はブロックエラー率ＢＬＥＲとdelta_SIR_target値のマッピングを示す図である。

【図６】

システム間ハンドオーバ用のＰＮ系列発生器ＰＮＧからのＰＮ系列の送信に関するハンドオーバ手順を示す図である。

【図７】

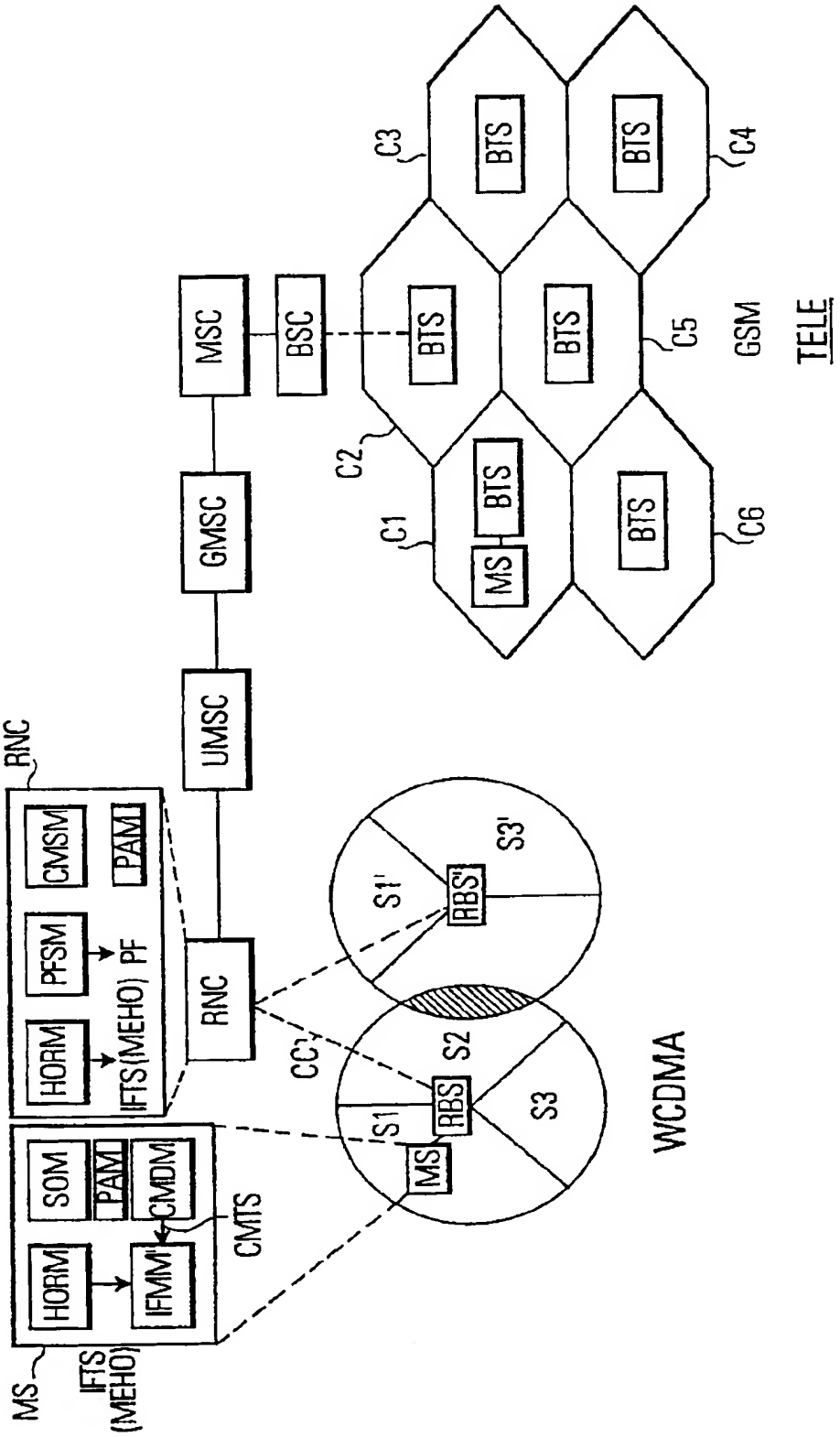
本発明による加入者局ＭＳ及びネットワーク制御手段ＲＮＣの基本的なブロック図である。

【図８】

本発明の原理に従ったステップＳＴ２１１，ＳＴ２１２を含む、図２と同様のフローチャートである。

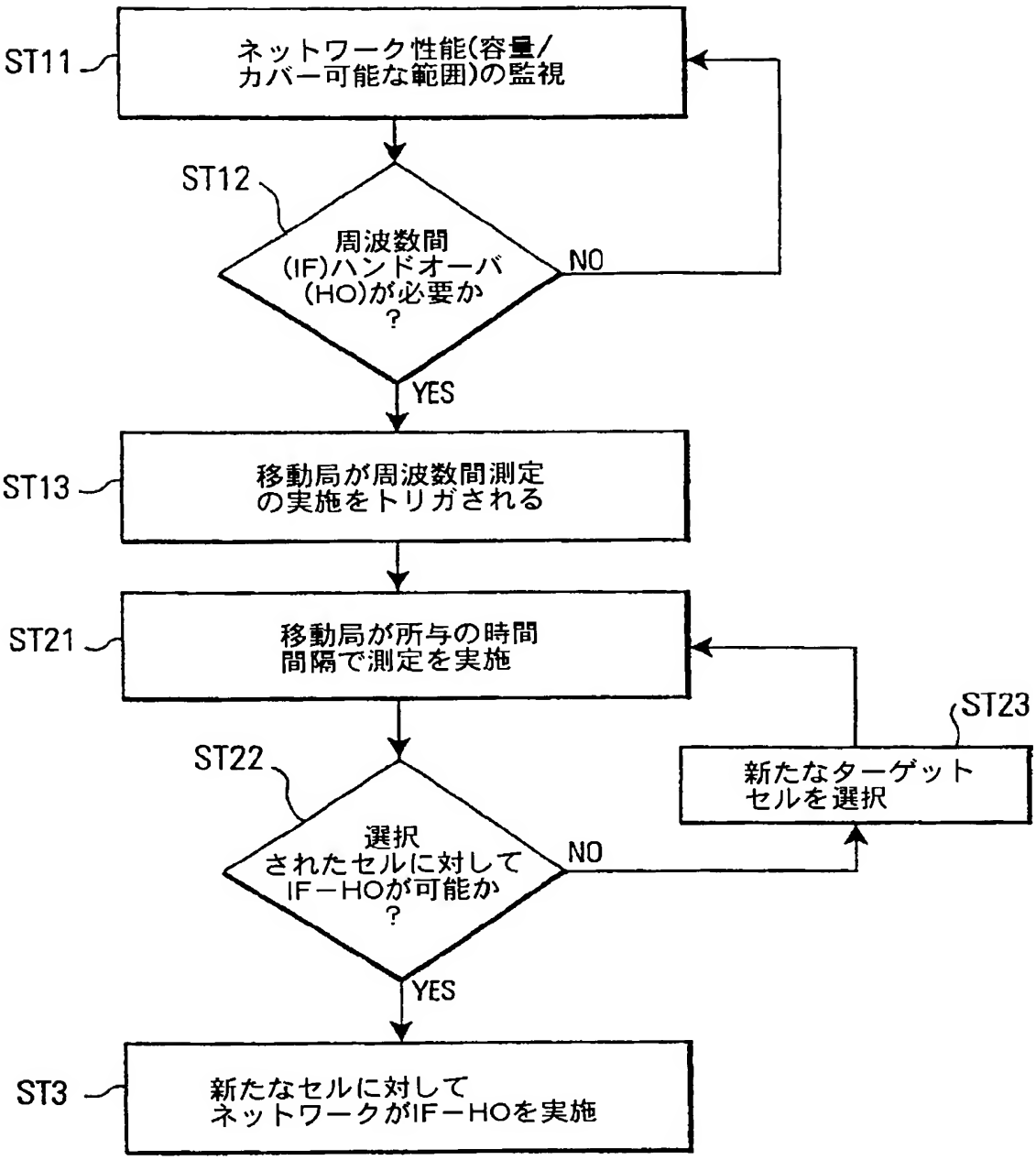
【図１】

FIG.1


T1
T2
MS
IFTS (MEHO)
HORM
IFMM
SOM
PAM
CMDM
CMTS
HORM
IFTS(MEHO) PF
PFSM
CMSM
PAM
RNC
UMSC
GMSC
MSC
BSC
RNC
MS
RBS
RBS'
S1
S2
S3
S1'
S3'
CC1
WCDMA
BTS
C1
C2
C3
C4
C5
C6
GSM
TELE

【図２】

FIG.2


ST11
ネットワーク性能(容量/
カバー可能な範囲)の監視
ST12
周波数間
(IF)ハンドオーバ
(HO)が必要か
?
NO
YES
ST13
移動局が周波数間測定
の実施をトリガされる
ST21
移動局が所与の時間
間隔で測定を実施
ST23
新たなターゲット
セルを選択
ST22
選択
されたセルに対して
IF－HOが可能か
?
NO
YES
ST3
新たなセルに対して
ネットワークがIF－HOを実施

【図３－１】

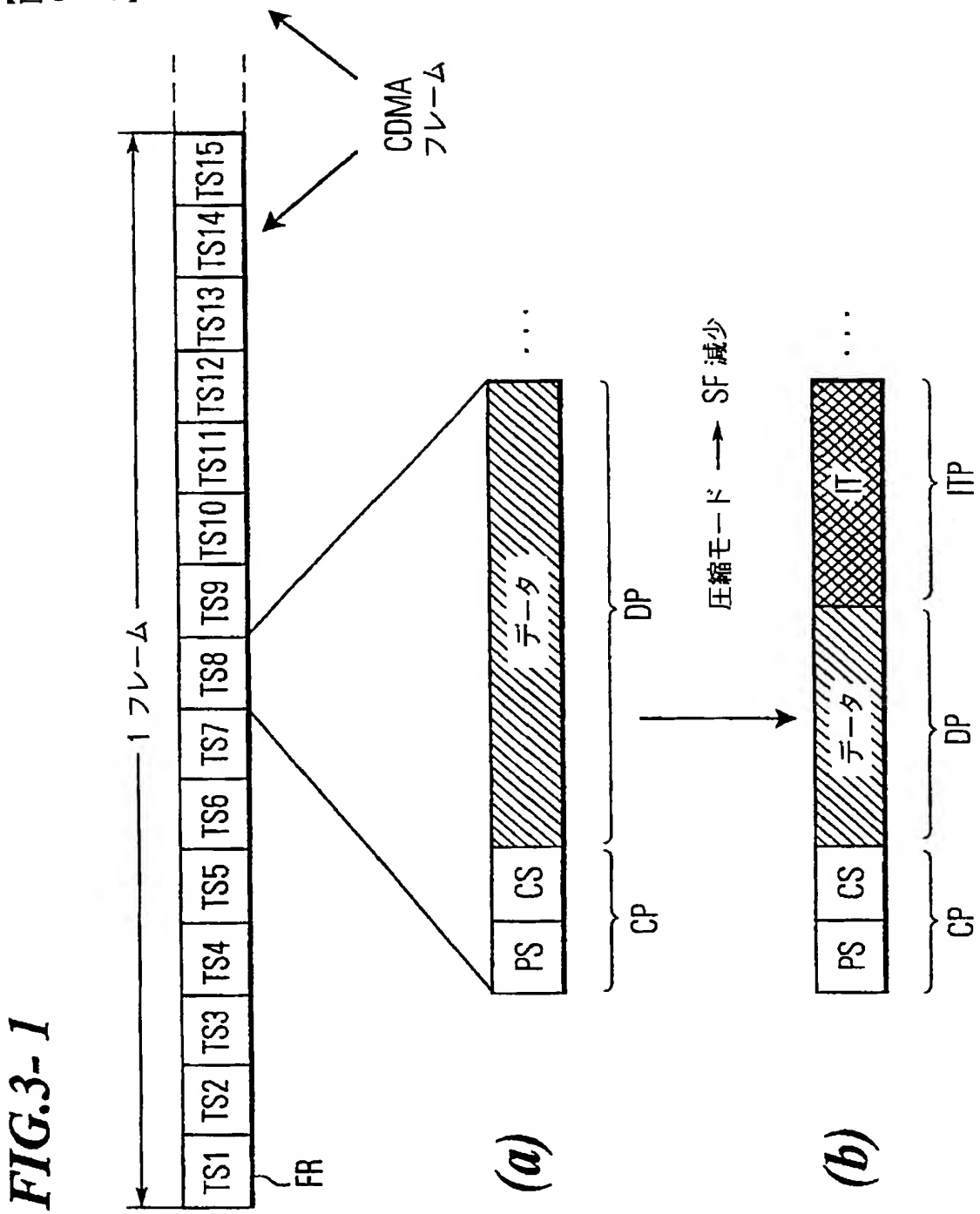
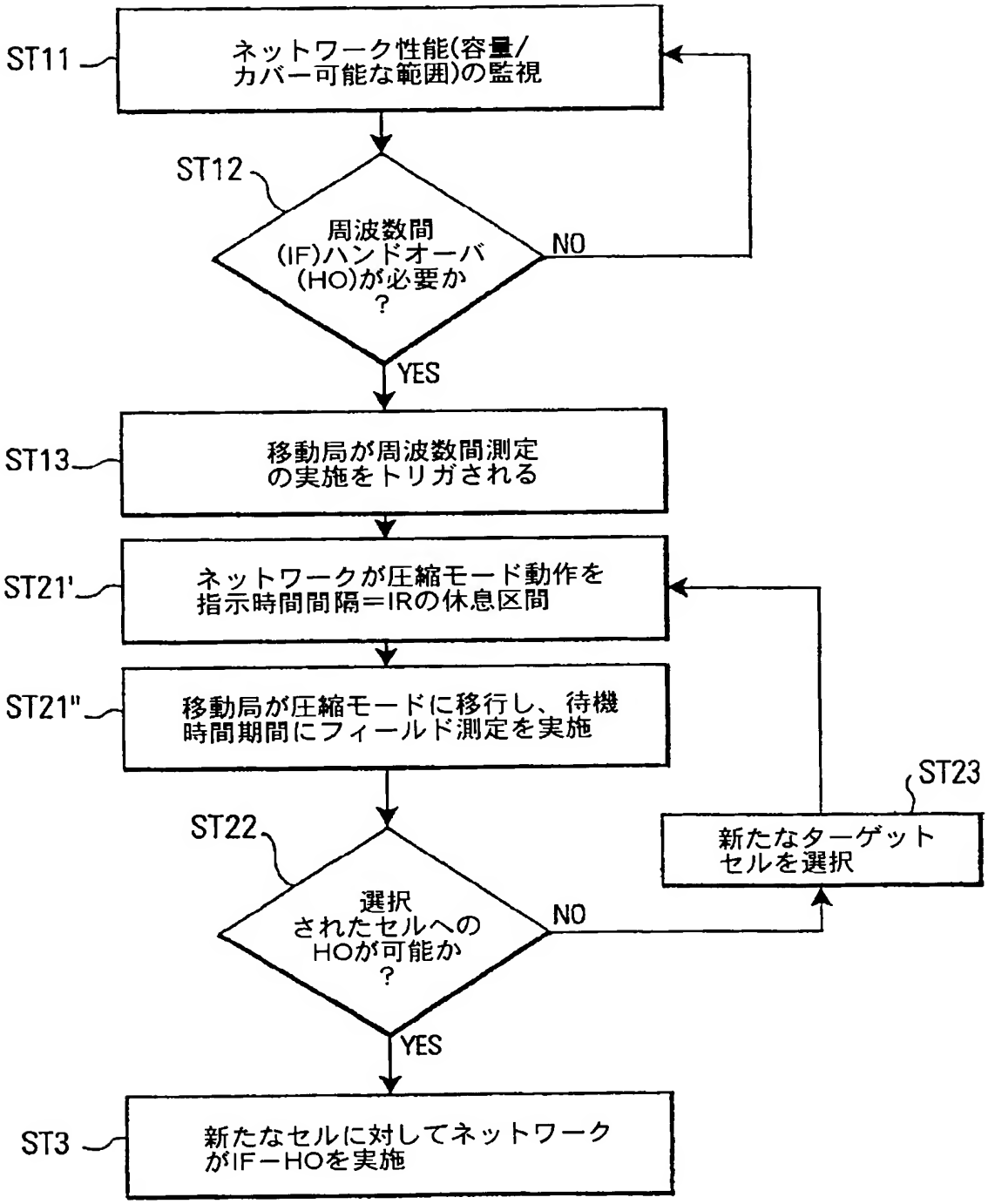

CDMA
フレーム
1フレーム
TS1
TS2
TS3
TS4
TS5
TS6
TS7
TS8
TS9
TS10
TS11
TS12
TS13
TS14
TS15
FR
(a)
PS
CS
データ
CP
DP
圧縮モード → SF減少
(b)
PS
CS
データ
IT
CP
DP
ITP

FIG.3-1

【図３－２】

FIG.3- 2


ST11
ネットワーク性能(容量/
カバー可能な範囲)の監視
ST12
周波数間
(IF)ハンドオーバ
(HO)が必要か
?
NO
YES
ST13
移動局が周波数間測定
の実施をトリガされる
ST21'
ネットワークが圧縮モード動作を
指示時間間隔＝IRの休息区間
ST21"
移動局が圧縮モードに移行し、待機
時間期間にフィールド測定を実施
ST22
選択
されたセルへの
HOが可能か
?
NO
YES
ST23
新たなターゲット
セルを選択
ST3
新たなセルに対してネットワーク
がIF－HOを実施

【図４－１】

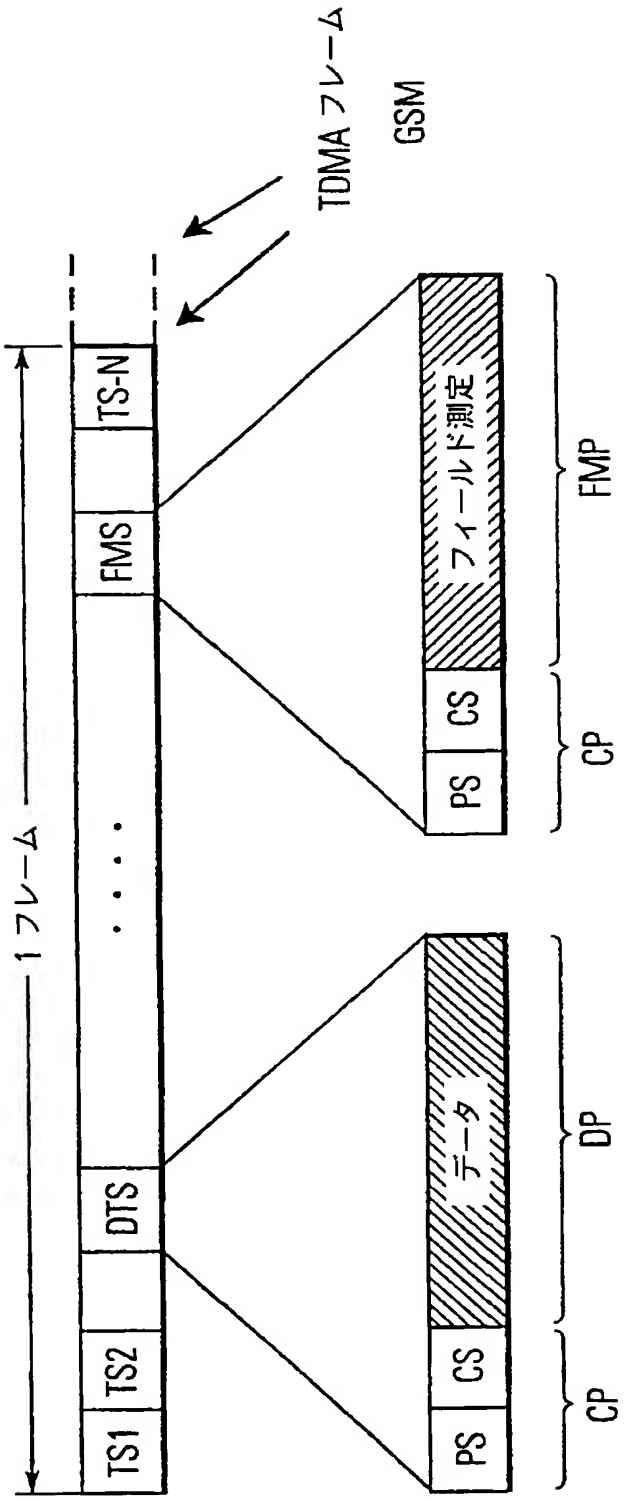
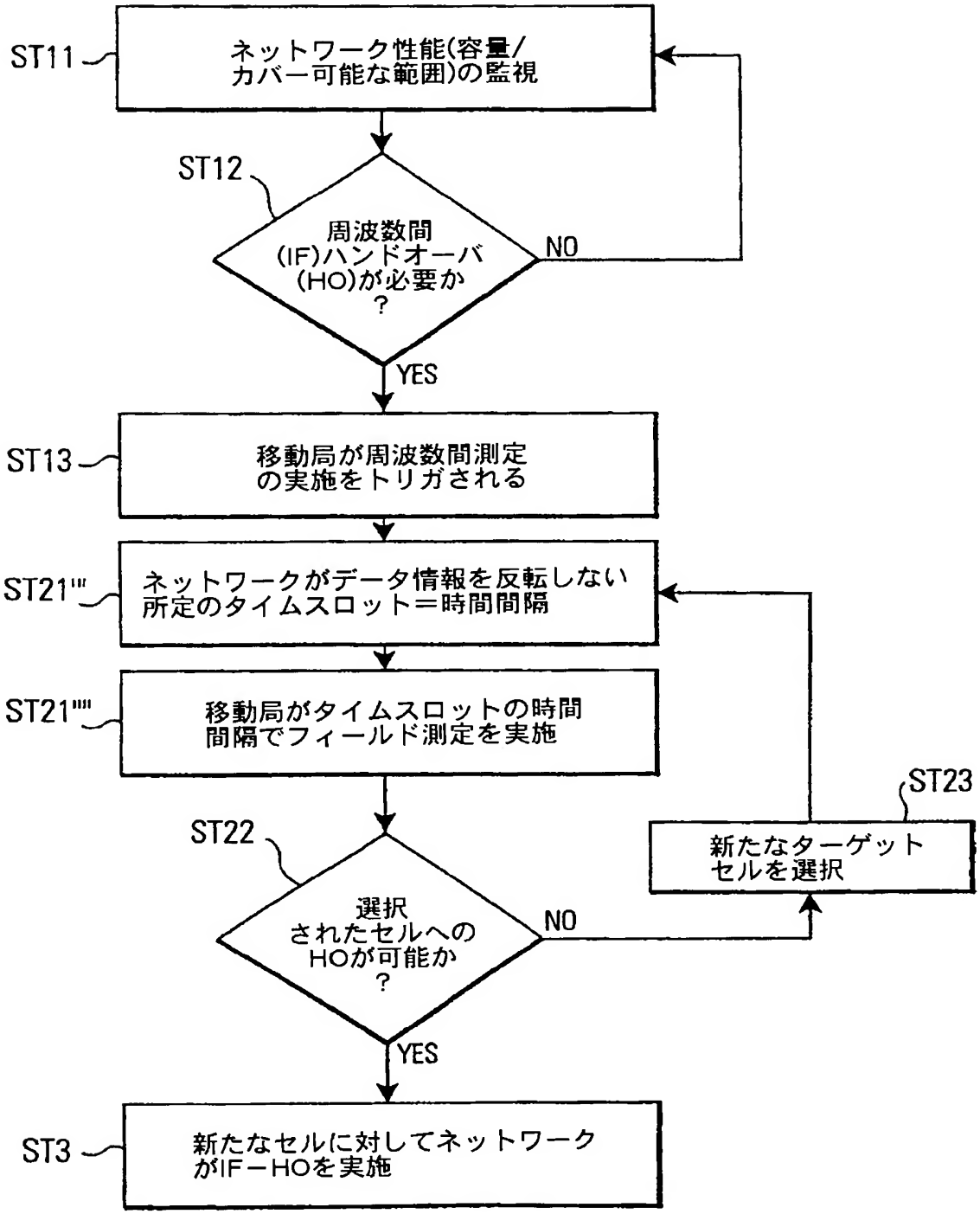

TDMA フレーム
GSM
1フレーム
TS1
TS2
DTS
FMS
TS-N
PS
CS
フィールド測定
CP
FMP
PS
CS
データ
CP
DP

FIG.4-1

【図４－２】

FIG.4-2


ST11
ネットワーク性能(容量/
カバー可能な範囲)の監視
ST12
周波数間
(IF)ハンドオーバ
(HO)が必要か
?
NO
YES
ST13
移動局が周波数間測定
の実施をトリガされる
ST21'''
ネットワークがデータ情報を反転しない
所定のタイムスロット＝時間間隔
ST21''''
移動局がタイムスロットの時間
間隔でフィールド測定を実施
ST22
選択
されたセルへの
HOが可能か
?
NO
YES
ST23
新たなターゲット
セルを選択
ST3
新たなセルに対してネットワーク
がIF－HOを実施

【図５ａ】

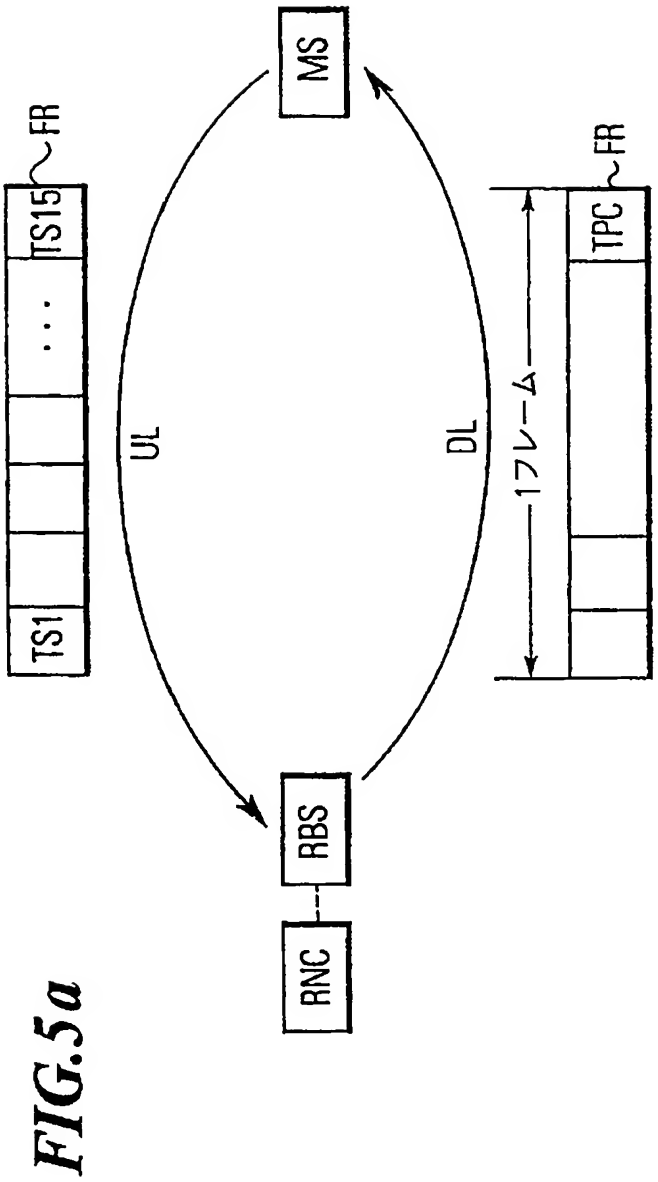


FIG.5a

【図５ｂ】

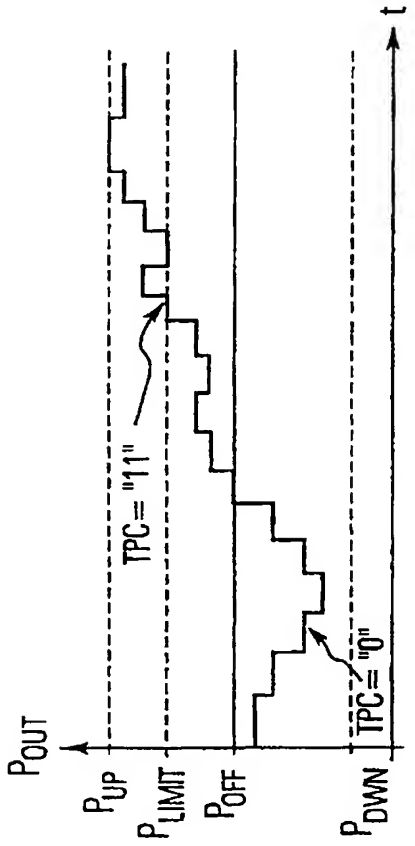
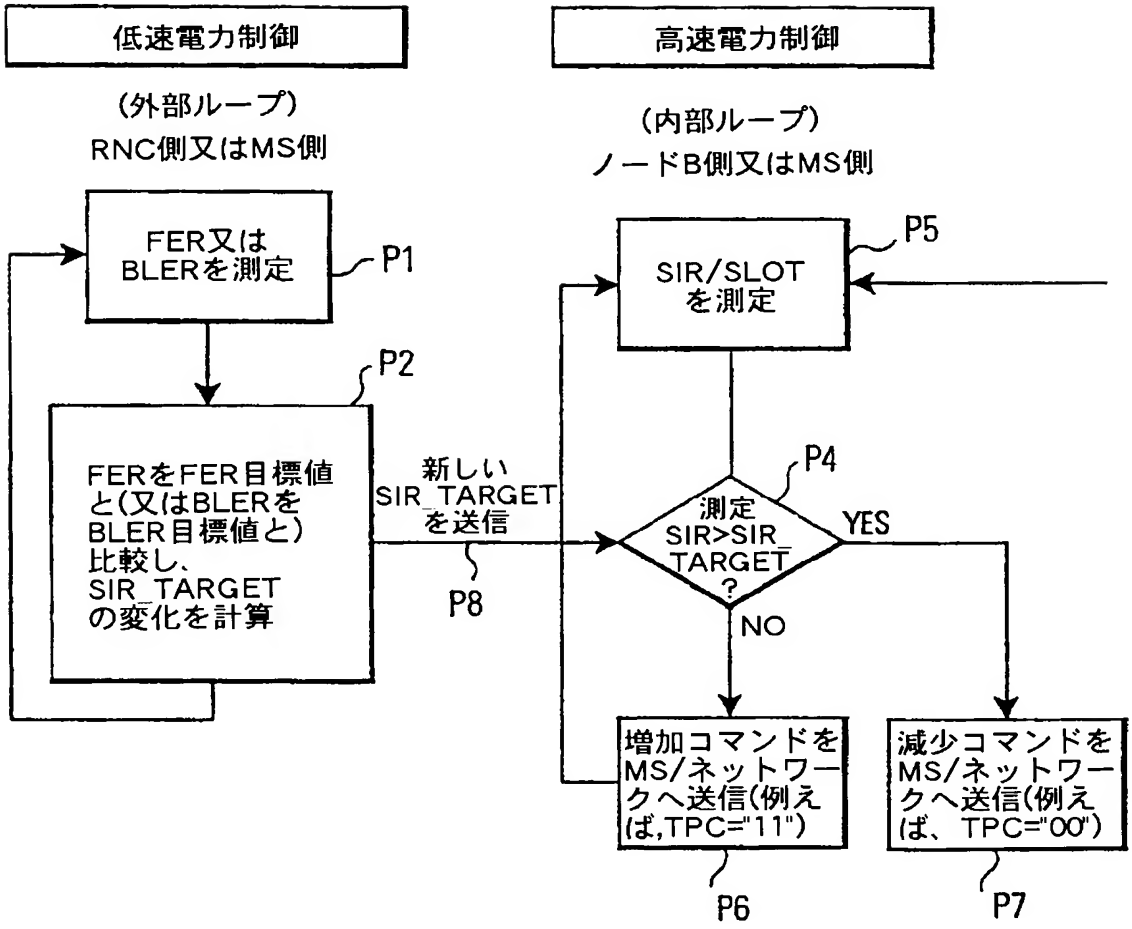


FIG.5b

【図５ｃ】
FIG.5c


低速電力制御
高速電力制御
(外部ループ)
RNC側又はMS側
(内部ループ)
ノードB側又はMS側
FER又は
BLERを測定
P1
P2
FERをFER目標値
と(又はBLERを
BLER目標値と)
比較し、
SIR_TARGET
の変化を計算
新しい
SIR_TARGET
を送信
P8
SIR/SLOT
を測定
P5
P4
測定
SIR>SIR_
TARGET
?
YES
NO
増加コマンドを
MS/ネットワー
クへ送信(例え
ば,TPC="11")
減少コマンドを
MS/ネットワー
クへ送信(例え
ば、TPC="00")
P6
P7

【図５ｄ】

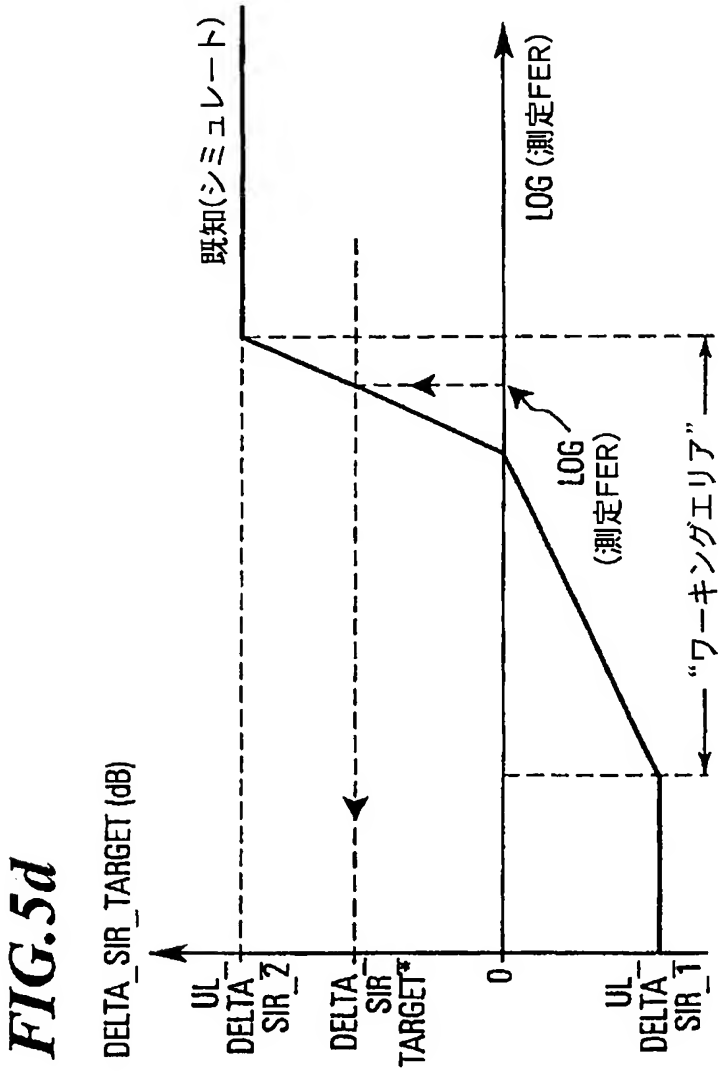

DELTA_SIR_TARGET (dB)
UL_DELTA_SIR_2
DELTA_SIR_TARGET*
0
UL_DELTA_SIR_1
既知(シミュレート)
LOG (測定FER)
LOG (測定FER)
"ワーキングエリア"

FIG.5d

【図６】

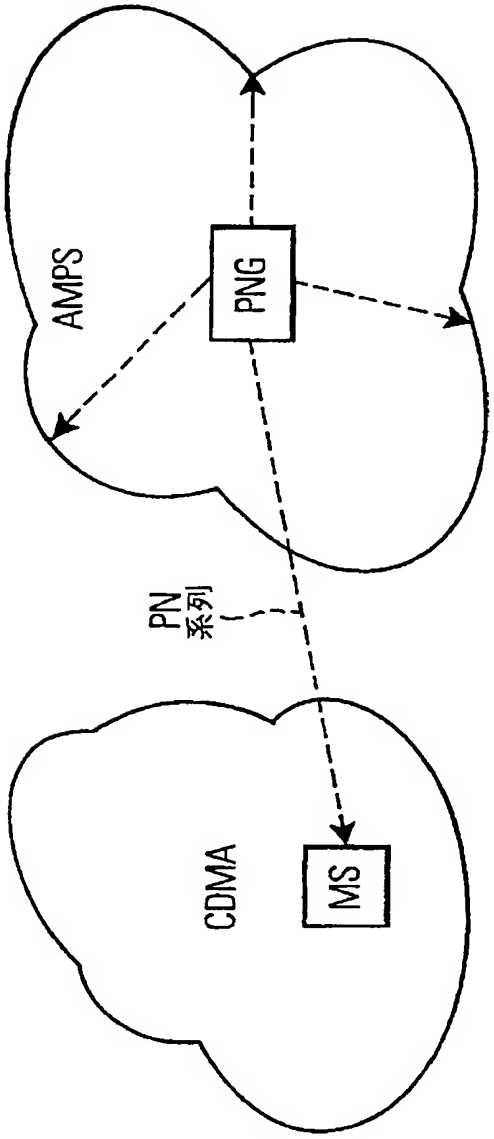
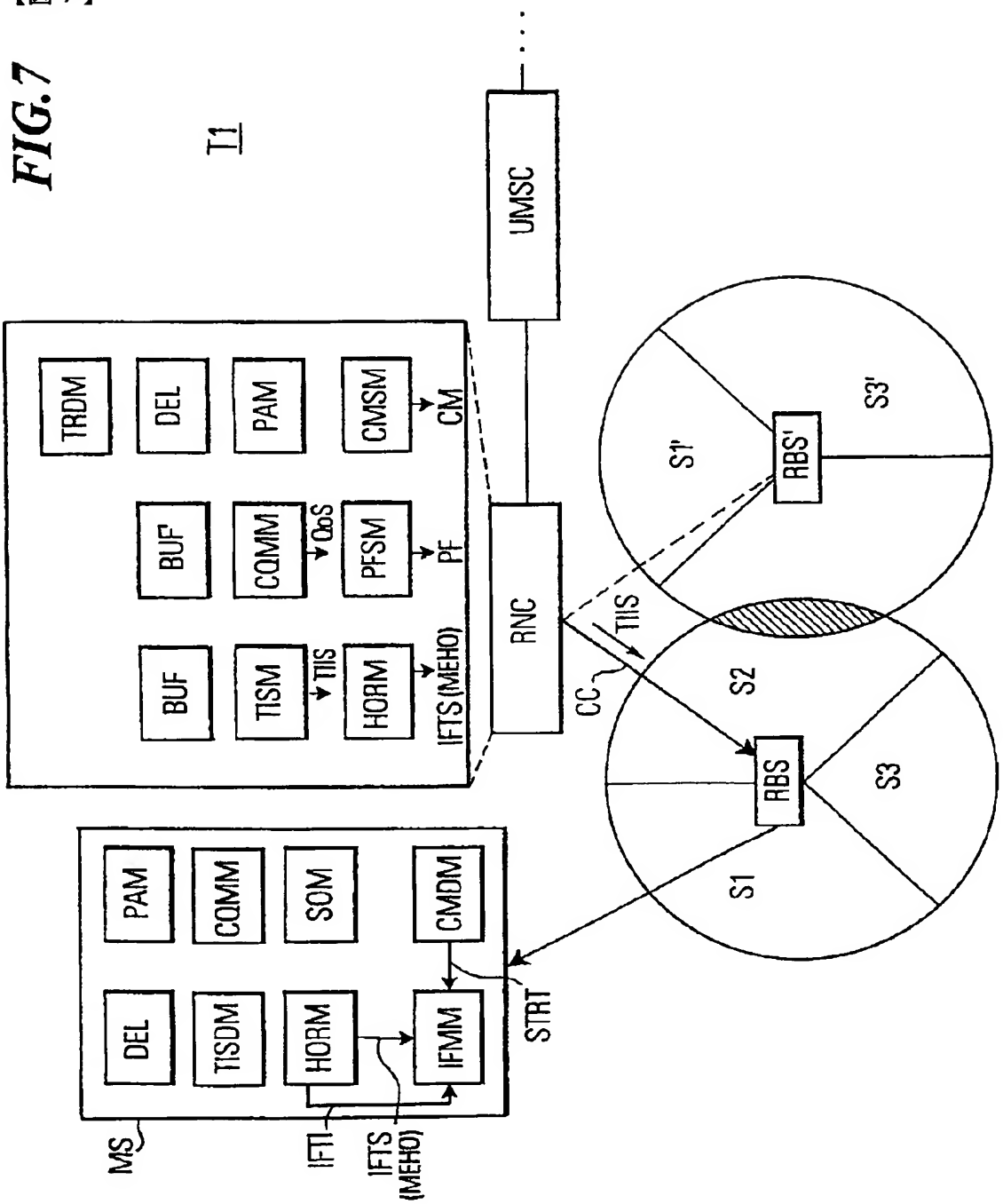


FIG.6

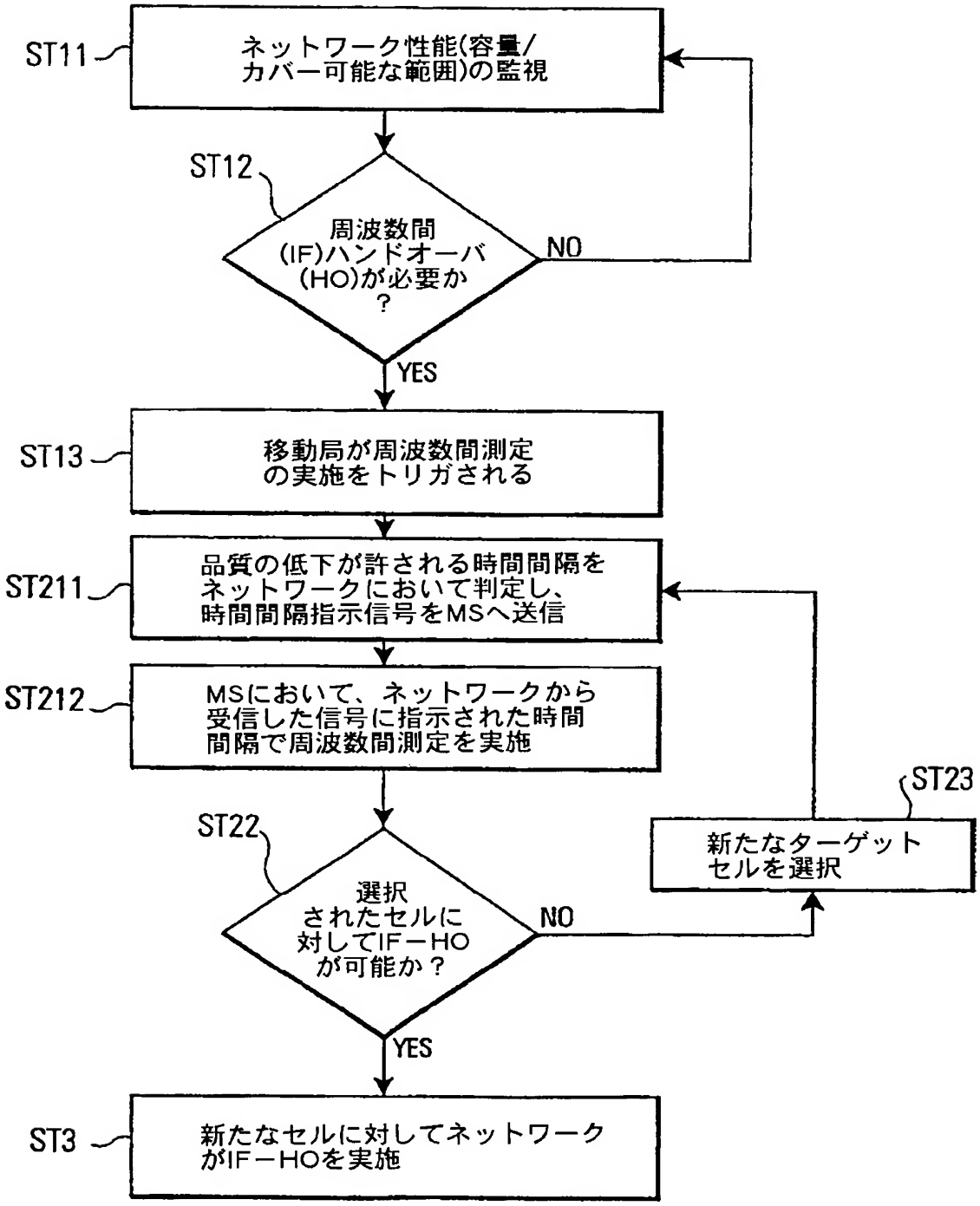
【図７】

FIG.7


T1
UMSC
TRDM
DEL
PAM
CMSM
CM
BUF
CQMM
QoS
PFSM
PF
BUF
TISM
TIIS
HORM
IFTS(MEHO)
RNC
CC
TIIS
S1'
S3'
RBS'
S2
RBS
S3
S1
PAM
CQMM
SOM
CMDM
DEL
TISDM
HORM
IFMM
STRT
MS
IFTI
IFTS
(MEHO)

【図８】

FIG.8


ST11
ネットワーク性能(容量/
カバー可能な範囲)の監視
ST12
周波数間
(IF)ハンドオーバ
(HO)が必要か
?
NO
YES
ST13
移動局が周波数間測定
の実施をトリガされる
ST211
品質の低下が許される時間間隔を
ネットワークにおいて判定し、
時間間隔指示信号をMSへ送信
ST212
MSにおいて、ネットワークから
受信した信号に指示された時間
間隔で周波数間測定を実施
ST22
選択
されたセルに
対してIF－HO
が可能か？
NO
YES
ST23
新たなターゲット
セルを選択
ST3
新たなセルに対してネットワーク
がIF－HOを実施

【国際調査報告】

INTERNATIONAL SEARCH REPORT

Interr nal Application No
PCT/EP 00/08117

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
INSPEC, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 533 014 A (WILLARS PER H A ET AL) 2 July 1996 (1996-07-02) column 5, line 5 -column 7, line 39 figure 3 ---	1,2,13, 14,30, 32,33, 42,43,54
A	US 5 896 368 A (DAHLMAN ERIC ET AL) 20 April 1999 (1999-04-20) column 7, line 50 -column 9, line 30 figure 3B ---	1,2,13, 14,30, 32,33, 42,43,54

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 November 2000	14/11/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Behringer, L.V.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inten nal Application No
PCT/EP 00/08117

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GUSTAFSSON M ET AL: "Compressed Mode Techniques for Inter-Frequency Measurements in a Wide-band DS-CDMA System" WAVES OF THE YEAR 2000+ PIMRC '97. THE 8TH IEEE INTERNATIONAL SYMPOSIUM ON PERSONAL, INDOOR AND MOBILE RADIO COMMUNICATIONS. TECHNICAL PROGRAM, PROCEEDINGS (CAT. NO.97TH8271), HELSINKI, FI, 1 - 4 September 1997, pages 231-235 vol.1, XP002127494 1997, New York, NY, USA, IEEE, USA ISBN: 0-7803-3871-5 page 232, right-hand column, line 3 -page 233, left-hand column, line 24 ---	1,13,32, 43,54
A	TS 25.231 V0.3.0 (1999-06); TECHNICAL SPECIFICATION; 3RD GENERATION PARTNERSHIP PROJECT (3GPP); TECHNICAL SPECIFICATION GROUP (TSG) RADIO ACCESS NETWORK (RAN); WORKING GROUP 1 (WG1); PHYSICAL LAYER - MEASUREMENTS, XP002127381 cited in the application * page 11, paragraph 5.1.3.3 "Monitoring of cells on different frequencies (FDD, TDD and GSM)" * -----	1,13,32, 43,54

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

.formation on patent family members

Inter nal Application No
PCT/EP 00/08117

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5533014 A	02-07-1996	US 5883899 A	16-03-1999
		US 5896368 A	20-04-1999
		AU 674241 B	12-12-1996
		AU 7013094 A	03-01-1995
		BR 9405405 A	08-09-1999
		CA 2141446 A	22-12-1994
		CN 1112384 A	22-11-1995
		EP 0647380 A	12-04-1995
		FI 950627 A	13-02-1995
		JP 8500475 T	16-01-1996
		NZ 267748 A	26-11-1996
		WO 9429981 A	22-12-1994
US 5896368 A	20-04-1999	US 5533014 A	02-07-1996
		AU 724048 B	07-09-2000
		AU 2718397 A	12-11-1997
		BR 9708730 A	03-08-1999
		CA 2252382 A	30-10-1997
		CN 1225764 A	11-08-1999
		EP 0895675 A	10-02-1999
		JP 2000509573 T	25-07-2000
		WO 9740592 A	30-10-1997
		US 5883899 A	16-03-1999

フロントページの続き

(81)指定国 EP(AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OA(BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG), AP(GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), EA(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW

(72)発明者 ミュラー, ヴァルテル, ゲルハルド, アロイス
スウェーデン国 ウップランドス ヴェスビュ エスー194 62, フギンヴェーゲン 7

Ｆターム(参考) 5K067 CC02 CC04 CC10 DD36 DD43 DD44 DD46 DD57 EE02 EE10 EE16 EE24 EE71 GG08 GG09 HH22 JJ37

JAPANESE [JP,2003-508991,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EXAMPLE DRAWINGS

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]They are at least one base transceiver office (RBS) and a subscriber station (MS) of a mobile communication system (GSM;WCDMA) which has a network control means (RNC) including IF measuring means (IFMM) which suited execution of (IF) measurement between frequency, It is a time interval of connection (CC) which was transmitting from said network control means (RNC), and was established between said subscriber station (MS) and said base transceiver office (RBS), It has the time interval signal detection means (TISDM) which suited so that IF repeat-time indication signal (TIIS) which specifies a time interval to which said subscriber station (MS) should perform IF measurement might be detected, A subscriber station conforming so that said IF measuring means (IFMM) may perform said IF measurement in said time interval specified in said IF repeat-time indication signal (TISS).
[Claim 2]The subscriber station (MS) according to claim 1, wherein said IF measuring means (IFMM) conforms so that said IF measurement may be performed over the whole time interval.
[Claim 3]The subscriber station (MS) according to claim 1 conforming so that said IF measuring means (IFMM) may answer IF measurement trigger signal (IFTS) and may start said IF measurement in said time interval.
[Claim 4]The subscriber station (MS) according to claim 3, wherein said IF repeat-time indication signal (TIIS) is included in said IF measurement trigger signal (IFTS).
[Claim 5]Said IF measurement trigger signal. When IF handover request means (HORM) judges with a transmission state in said mobile communication system needing IF handover of said subscriber station (MS) in (IFTS) (NEHO;MEHO), by said IF handover means (HORM). The subscriber station (MS) according to claim 3 or 4 generating.
[Claim 6]Said IF handover means (HORM) is located in a network control means (RNC) of said mobile communication system, and answers determination of a network evaluation handover (NEHO), The subscriber station (MS) according to claim 3 or 4 conforming so that said IF measurement trigger signal (IFTS) may be transmitted to said subscriber station (MS) via a base transceiver office (RBS).
[Claim 7]The subscriber station (MS) according to claim 3 or 4 conforming so that said IF handover means (HORM) may be located in said subscriber station (MS), may answer determination of a mobile station evaluation handover (MEHO) and may output said IF measurement trigger signal (IFTS).
[Claim 8]Said subscriber station (MS) supervises a quality of service (QoS) on said established communication interface (CC), The subscriber station (MS) according to claim 1 having the switching performance monitor means (CQMM) which suited so that information on said quality of service (QoS) might be transmitted to said network control means (RNC).
[Claim 9]The subscriber station (MS) comprising according to claim 1:
While data communications sensitive to delay are performed between said base transceiver office (RBS) and said subscriber station (MS) during said connection (CC) Said subscriber station (MS), A deleting means (DEL) for deleting data which reached from said base transceiver office (RBS) into said time interval,
A power regulating means to which transmission power in uplink on said communication interface

(CC) is made to increase before a start of said time interval, and/or after an end of said time interval (Pulse Amplitude Modulation).

[Claim 10]The subscriber station (MS) according to claim 1, wherein data communications sensitive to a loss are performed between said base transceiver office (RBS) and said subscriber station (MS) during said connection (CC).
[Claim 11]While data communications between said said subscriber station (MS) and a base transceiver office (RBS) are performed via transmission of a data frame (FR) containing a data part (DP) and a control section (CP), So that a time slot may be provided with a standby time interval to which data communications are not carried out for data communications between said subscriber station (MS) and said base transceiver office (RBS), Compressed mode into which transmission data in said data part (DP) in said at least one time slot is compressed performs, A compressed mode detection means (CMDM) by which said subscriber station (MS) detects data communications in said compressed mode is included, The subscriber station (MS) according to claim 1 corresponding to two or more standby time intervals of two or more data frames said time intervals were instructed to be with said IF repeat-time indication signal (TIIS), and a data frame to which data communications are performed by compressed mode.
[Claim 12]Said IF measuring means (IFMM) measures also in an additional time interval which data communications generate from said base transceiver office (RBS), The subscriber station (MS) according to claim 1 or 11 having a deleting means (DEL) which deletes data in which said subscriber station (MS) reached into said additional time interval.
[Claim 13]. Are characterized by comprising the following. How to perform (IF) measurement between frequency (ST21;ST21";ST21"") in a subscriber station (MS) of a mobile communication system (GSM;WCDMA) which has at least one base transceiver office (RBS) and a network control means (RNC)
A step which chooses IF repeat time in a network control means (RNC) during connection (CC) between said subscriber station (MS) and said base transceiver office (RBS) (ST211).
A step which transmits IF repeat-time indication signal (TIIS) which directs said time interval of said connection (CC) which should perform said IF measurement by said subscriber station (MS) from said network control means (RNC) to said subscriber station (MS) (ST211).
A step which performs said IF measurement in said subscriber station (MS) into said time interval of said connection so that it may be directed with said IF repeat-time indication signal (TIIS) (ST212).

[Claim 14]A method according to claim 13, wherein said IF measurement is performed over said whole time interval.
[Claim 15]A method according to claim 13 characterized by what IF measurement trigger signal (IFTS) is answered and said IF measurement is carried out for (ST13).
[Claim 16]A method according to claim 15, wherein said IF repeat-time indication signal (TIIS) is transmitted in said IF measurement trigger signal (IFTS) (ST13;ST211).
[Claim 17]A method comprising according to claim 15:
A step which judges whether a transmission state in said mobile communication system needs IF handover of said subscriber station (MS) (ST11).
Step S which generates said IF measurement trigger signal (IFTS) when judged with IF handover being required (NEHO;MEHO) (ST13).

[Claim 18]Said step (ST11) which judges whether a transmission state in said mobile communication system needs IF handover of said subscriber station (MS), it performs by IF handover request means (HORM) located in a network control means (RNC) of said mobile communication system -- determination of a network evaluation handover (NEHO) being answered and, A method according to claim 17 characterized by what said IF measurement trigger signal (IFTS) is transmitted for to said subscriber station (MS) via said base transceiver office (RMS) (ST13).
[Claim 19]said step (ST11) which judges whether a transmission state in said mobile

communication system needs IF handover of said subscriber station (MS) -- and, A method according to claim 17, wherein generation of said IF measurement trigger signal (IFTS) answers determination of a mobile station evaluation handover (MEHO) and is performed by IF handover request means (HORM) located in said subscriber station (MS).
[Claim 20]A method according to claim 13 characterized by transmitting information on said quality of service (QoS) to said network control means (RNC) while a quality of service (QoS) on an established communication interface is supervised in said subscriber station (MS).
[Claim 21]A method according to claim 13 characterized by transmitting information on said quality of service (QoS) to said network control means (RNC) while a quality of service (QoS) on an established communication interface is supervised in said base transceiver office (RBS).
[Claim 22]While said time interval of said communication interface is chosen based on said information on said quality of service (QoS), A method according to claim 20 or 21, wherein said time interval is chosen as a time interval to which temporary aggravation of said quality of service by said IF measuring means (IFMM) performing said IF measurement is permitted.
[Claim 23]Data communications sensitive to delay between said connection are performed between said base transceiver office (RBS) and said subscriber station (MS), A method according to claim 13, wherein data from said base transceiver office (RBS) which reached into said time interval is deleted and transmission power on a down-link (DL) on said communication interface and uplink (UL) is increased before a start of said time interval, and/or after an end of said time interval.
[Claim 24]Data communications sensitive to a loss between said connection are performed between said base transceiver office (RBS) and said subscriber station (MS), Before being transmitted on said down-link of said communication interface, said send data, it is saved temporarily in a transmission buffer means (BUF) to have the prescribed size within said network control means (RNC) -- in said time interval performed, said IF measurement by said IF measuring means (IFMM), Said transmission buffer means (BUF) saves temporarily said at least some of send data which should be transmitted in said time interval, A method according to claim 13, wherein said network control means (RNC) transmits said saved data to said subscriber station (MS) after an end of said time interval.
[Claim 25]Data communications sensitive to a loss between said connection are performed between said base transceiver office (RBS) and said subscriber station (MS), In order that said network control means (RNC) may carry out intermediate memory before said send data is transmitted on said down-link (DL) of said communication interface, it has a transmission buffer means (BUF) of prescribed size, while said network control means (RNC) decreases a data transmission rate in said time interval to which said IF measurement is performed by said IF measuring means (IFMM), A method according to claim 13 of raising said data transmission rate again after an end of said time interval.
[Claim 26]When data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF), in order to supply a storage capacity for intermediate memory of bigger send data, A method according to claim 25 that said network control means (RNC) is characterized by performing a re-schedule using other buffer means (BUF').
[Claim 27]When data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF), In order to make said buffer size of said buffer means increase and to decrease buffer size of other buffer means (BUF'), said network control means (RNC) -- said -- others -- a method according to claim 25 conforming so that a dynamic buffer schedule may be performed using a buffer means (BUF').
[Claim 28]A method according to claim 25 that a deleting means of said network control means (RNC) is characterized by deleting at least one copy of data which should be transmitted into said time interval when data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF).
[Claim 29]A ratio between data frames (FR) by which said IF handover request means (HORM) was transmitted / received, and it has the transmission ratio judging means (TRDM) which suited so that said measuring time might be judged -- a method according to claim 28 when said

transmission/receiving ratio is less than a predetermined ratio, wherein said IF handover request means (HORM) outputs said IF measurement trigger signal (IFTS).
[Claim 30]While data communications between said base transceiver office (RBS) and said subscriber station (MS) are performed via transmission of a data frame (FR) containing a data part (DP) and a control section (CP), In compressed mode operation, data of said data part (DP) in at least one time slot of a data frame, In said network control means (RNC), it is compressed to supply a standby time interval (IT) which data communications do not generate into said time slot (ST21'), Two or more data frames with which data communications in said compressed mode were detected by said subscriber station (MS) (ST21''), and said time intervals were instructed to be with said IF repeat-time indication signal (TIIS), A method according to claim 13 that data communications are characterized by corresponding to two or more standby time intervals (IT) of a data frame performed by compressed mode (ST21'').
[Claim 31]Said IF measurement is carried out also in an additional time interval which data communications generate from said base transceiver office (RMS), A method according to claim 13 or 25, wherein data which reached from said base transceiver office (RBS) into said additional time interval is discarded by said subscriber station (MS).
[Claim 32]At least one subscriber station (MS) including IF measuring means (IFMM) which suited execution of (IF) measurement between frequency.
Said network control means (RNC) for performing said subscriber station (MS) and data communications during at least one base transceiver office (RBS) and connection.
Are the system provided with the above and it has the time interval signal detection means (TISDM) which suited so that said IF repeat-time indication signal (TIIS) which directs said time interval might be detected, Said IF measuring means (IFMM) conforms so that said IF measurement may be performed with said time interval specified within said said detected IF repeat-time indication signal (TIIS).

[Claim 33]The system according to claim 32, wherein said IF measuring means (IFMM) conforms so that said IF measurement may be performed over the whole time interval.
[Claim 34]The system according to claim 33, wherein said IF measuring means (IFMM) conforms so that IF measurement trigger signal (IFTS) may be answered and said IF measurement may be performed.
[Claim 35]It is judged whether a transmission state in said mobile communication system needs IF handover of said subscriber station (MS), The system according to claim 32 having further IF handover request means (HORM) which suited so that said IF measurement trigger signal (IFTS) might be generated, when judged with IF handover being required (NEHO;MEHO).
[Claim 36]The system according to claim 35, wherein said IF handover request means (HORM) is located in said subscriber station (MS), answers determination of a mobile station evaluation handover (MEHO) and said IF measurement trigger signal (IFTS) is generated.
[Claim 37]Said subscriber station (MS) supervises a quality of service (QoS) on said established communication interface, The system according to claim 32 having the switching performance monitor means (CQMM) which suited so that information on said quality of service (QoS) might be transmitted to said network control means (RNC).
[Claim 38]Said base transceiver office (RBS) supervises a quality of service (QoS) on said established communication interface, The system according to claim 32 having the switching performance monitor means (CQMM) which suited so that information on said quality of service (QoS) might be transmitted to said network control means (RNC).
[Claim 39]While said IF repeat-time selecting means (TISM) chooses said time interval of said communication interface based on said information on said quality of service (QoS), The system according to claim 37 or 38, wherein said time interval is chosen as a time interval to which temporary aggravation of said quality of service by said IF measuring means (IFMM) performing said IF measurement is permitted.
[Claim 40]Data communications sensitive to delay are performed between said communication interfaces between said base transceiver office (RBS) and said subscriber station (MS), Said subscriber station (MS) has a deleting means (DEL) which deletes data which reached from said

base transceiver office (RBS) between said time intervals, Each of said network control means (RNC) and said subscriber station (MS), The system according to claim 39 having a power regulating means (Pulse Amplitude Modulation) which makes transmission power on a down-link (DL) of said communication interface, and uplink (UL) increase before a start of said time interval, and/or after an end of said time interval, respectively.
[Claim 41]The system according to claim 32, wherein data communications sensitive to said loss are the data communications under web browsing.
[Claim 42]Data communications between said base transceiver office (RBS) and said subscriber station (MS), it performs by transmission of a data frame (FR) containing a control section (CP) and a data part (DP) -- said network control means (RNC) in compressed mode operation, Data of said data part (DP) in at least one time slot of a data frame, It has the compressed mode operation means (CMOM) which suited so that it might compress to supply a standby time interval (IT) which data communications do not generate into said time slot, Said subscriber station (MS) has a compressed mode detection means (CMDM) to detect data communications in said compressed mode, The system according to claim 32 corresponding to two or more standby time portions of a data frame from which data communications are performed by two or more data frames and compressed modes said time interval was instructed to be with said IF repeat-time indication signal (TIIS).
[Claim 43]In order [on established connection] to control data communications between a subscriber station (MS) and at least one base transceiver office (RBS) at least, it is a network control means (RNC) of a mobile communication system -- said subscriber station (MS) a time interval which should perform IF measurement, [choose and] A network control means (RNC) having IF repeat-time selecting means (TISM) which suited so that IF repeat-time indication signal (TIIS) containing said time interval might be transmitted to said subscriber station (MS).
[Claim 44]The network control means (RNC) according to claim 43 characterized by transmitting said IF repeat-time specification signal (TIIS) with IF measurement trigger signal (IFTS) from said IF repeat-time selecting means (TISM).
[Claim 45]It is judged whether a transmission state in said mobile communication system needs IF handover of said subscriber station (MS), The network control means (RNC) according to claim 44 having IF handover request means (HORM) which generates said IF measurement trigger signal (IFTS) when judged with IF handover (NEHO;MEHO) being required.
[Claim 46]Said IF repeat-time selecting means (TISM) chooses said time interval of said communication interface based on quality-of-service (QoS) information, The network control means (RNC) according to claim 43, wherein said time interval is chosen if possible with a time interval allowed temporary deterioration of a quality of service according [said IF measuring means (IFMM)] to said IF measurement execution.
[Claim 47]Data communications sensitive to delay are performed between said communication interfaces between said base transceiver office (RBS) and said subscriber station (MS), The network control means (RNC) according to claim 45, wherein said network control means (RNC) has a power regulating means (Pulse Amplitude Modulation) to which transmission power on a down-link of said communication interface is made to increase, respectively before a start of said time interval, and/or after an end of said time interval.
[Claim 48]Data communications sensitive to a loss are performed between said communication interfaces between said base transceiver office (RBS) and said subscriber station (MS), It has a transmission buffer means (BUF) of prescribed size for intermediate memory of said transmission data before said network control means (RNC) is transmitted on a down-link of said communication interface, In said time interval with which said IF measurement is performed by said IF measuring means (IFMM), Said transmission buffer (BUF) memorizes temporarily at least one copy of said transmission data which should be transmitted into said time interval, The network control means (RNC) according to claim 46, wherein said network control means (RNC) transmits said memorized data to said subscriber station (MS) after an end of said time interval.
[Claim 49]Data communications sensitive to a loss are performed between said communication interfaces between said base transceiver office (RBS) and said subscriber station (MS), It has a transmission buffer means (BUF) of prescribed size for intermediate memory of said transmission

data before said network control means (RNC) is transmitted on a down-link of said communication interface, In said time interval with which said IF measurement is performed by said IF measuring means (IFMM), A network control means (RNC) given in any 1 paragraph of claim 46, wherein said network control means (RNC) decreases speed of said data communications and raises speed of said data communications again after an end of said time interval thru/or claim 48.

[Claim 50]Since a bigger storage capacity than those for said intermediate memory of transmission data is provided when data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF), The network control means (RNC) according to claim 48 conforming so that said network control means (RNC) may perform a re-schedule using other buffer means (BUF').

[Claim 51]When data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF), In order to make said buffer size of said buffer means increase and to decrease buffer size of other buffer means (BUF'), said network control means (RNC) -- said -- others -- the network control means (RNC) according to claim 48 conforming so that a dynamic buffer schedule may be performed using a buffer means (BUF').

[Claim 52]When data volume which should be transmitted into said time interval is larger than said prescribed size of said buffer means (BUF), The network control means (RNC) according to claim 48, wherein a deleting means (DEL) of said network control means (RNC) deletes at least one copy of said data which should be transmitted into said time interval.

[Claim 53]A ratio between data frames (FR) by which said IF handover request means (HORM) was transmitted and received, And it has the transmission ratio judging means (TRDM) which suited so that said measuring time might be judged, The network control means (RNC) according to claim 45 when said transmission/receiving ratio is less than a predetermined ratio, wherein said IF handover request means (HORM) outputs said IF measurement trigger signal (IFTS).

[Claim 54]A mobile communication system having at least one subscriber station (MS) of a statement of any one or more paragraphs of a network control means (RNC) of a statement of any one or more paragraphs of at least one base transceiver office (RBS), claim 43, or claim 53 and claim 1 thru/or claim 12.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
(Technical field to which an invention belongs)
This invention relates to the subscriber station, network control means, and method of performing measurement between the frequency (inter-frequency) in a mobile communication system. This invention relates to the mobile communication system with which such a subscriber station, a network control means, and a method are used again.
[0002]
When the transmission state of the connection (a communication interface or signaling connection) between a subscriber station and a base transmitting station is supervised in a mobile communication system, for example, a transmission state deteriorates so that details may be explained below, the necessity between frequency or for the handover between systems is detected. If the necessity between frequency or for the handover between systems is detected, in order to show this necessity, the measurement trigger signal between frequency will be generated, and the measurement between frequency to different frequency from frequency present in use will be started. When a trigger signal is answered, measurement between frequency is performed about one or more different frequency and suitable new frequency is found, between actual frequency or the handover between systems is performed. Henceforth, even if the word "handover" is a case where it does not indicate clearly, it expresses between frequency or the handover between systems.
[0003]
When connection is established between a base transmitting station and a subscriber station, even if it is a case where only the subscriber station and signal connection of an active mode are established, In the connection, some data traffic always exists, and a subscriber station and the network must perform measurement between frequency, when there are no data communications. This is because some data which probably communicated the connection top will be lost if measurement between frequency is not performed. Other important viewpoints are how to be [when] generation **** about the measurement trigger signal between frequency by a network in order to start measurement between frequency. However, the measurement between frequency itself should care about answering the measurement trigger signal between frequency and always performing by a subscriber station.
[0004]
The problem which time interval this invention should use in order to perform measurement between these frequency in a subscriber station especially is solved.
Hereafter, the shortening notation is carried out with "IF" between frequency.
[0005]
(Background art)
Drawing 1 shows a general general view of at least two different mobile communication systems T1 and telecommunication system TELE which has T2 about the conventional method for carrying out the trigger of the IF measurement in a mobile communication system. For example, the subscriber station which is mobile station MS can operate with the 1st mobile

communication system T1, and operates also in the 2nd mobile communication system T2. each -- a mobile communication system -- T -- one -- T -- two -- an inside -- a mobile station -- MS -- differing -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- and -- C -- one - C -- six -- moving about -- things -- being possible . By a different handover standard, mobile station MS performs the handover between systems from /to the system of the handover between frequency within the same system, and another side. Are equally applicable to this invention carrying out the trigger of the handover between frequency within the same system, and/or the handover between systems good here, Drawing 1 should only care about that the two mobile communication systems T1 and T2 are shown as an example from which both handover procedure of them may arise.

[0006]

To drawing 1, as an example of the 1st mobile communication system T1, the network control means RNC (Radio Network Controller), At least one base transceiver office RBS and RBS' (in WCDMA, called a base transceiver station), At least one subscriber station MS (Mobile.) Station -- and -- a large number -- overlap (probably) -- having carried out -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- having -- WCDMA (Wideband Code Division Multiple Access) -- or -- CDMA (Code.) A Division Multiple Access communications system is shown.

[0007]

An example of the 2nd mobile communication system T2 GSM (Global System for Mobile Communications), It is a communications system according to PDC (Personal Digital Cellular) and a D-AMPS (Digital-Advanced Mobile Personal Service) standard.

[0008]

In drawing 1, an example of a GSM system is shown as the 2nd mobile communication system T2. However, it should care about that this invention is not fundamentally limited to an above-mentioned system applicable to the digital cellular system of arbitrary forms therefore. The GSM system shown in drawing 1 has the conventional base station controller BSC, at least one mobile-communication-exchange MSC, and the gateway mobile-services switching center GMSC. Service is provided for mobile station MS by two or more base transceiver offices BTS in cell C1-C6 with movable mobile station MS.

[0009]

The network control means RNC of the WCDMA system in drawing 1 is connected to the gateway mobile-services switching center GMSC of a GSM system via a UMSC unit.

[0010]

the -- one -- and -- the -- two -- a mobile communication system -- T -- one -- T -- two -- being geographical -- arrangement -- responding -- the -- one -- a mobile communication system -- T -- one -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- again -- the -- two -- a mobile communication system -- T -- two -- a cell -- C -- one - C -- six -- perfect -- or -- partial -- it may overlap . Of course, if mobile station MS performs the handover between systems, the mobile station MS will be able to operate according to use of the 1st and 2nd mobile communication systems.

[0011]

One reason for performing between frequency or the handover between systems in telecommunication system TELE in drawing 1 is based on the reason (coverage reasons) for being related with the range which can be covered. this -- not only the 1st communications system -- what kind of -- others -- a system also depends all the geographical regions, for example, the hot spot of UMTS, on the fact that it cannot cover thoroughly. Some cells in a mobile communication system may be operating on frequency inapplicable to an adjacent cell. Therefore, it becomes possible by making mobile station MS or the network control means RNC carry out either the handover between frequency, or the handover between systems to use mobile station MS in a larger field, without interrupting communication.

[0012]

Another reason for performing a handover is a reason (capacity reasons) for being related with capacity. Either this mobile communication system or other mobile communication systems may

receive a heavy load occasionally, therefore the handover between systems is needed in this case. Similarly connection is established on specific frequency with mobile station MS, and it must stop having to use another frequency after that. This another frequency exists in the inside of the same cell, or other cells, and, generally [all] is called the handover between frequency. As shown in drawing 1, measurement between frequency (required for the handover between frequency and/or the handover between systems) is always performed by the measuring means IFMM between frequency provided in mobile station MS.

[0013]

The network control means RNC has the call flag transmitting means PFSM which transmits a call flag to mobile station MS, when the signaling communication link is already established between subscriber station MS and the network. For example, when mobile station MS is started and it registers with the network, a subscriber station is in having existing registered and non-active mode operation. Standby-operations means SOM maintains a subscriber station in non-active mode operation. In such non-active mode operation, operation of subscriber station MS is suspended at the time of the call flag PF reception from the network control means RNC, i.e., the call to subscriber station SS, and when a communication interface is set to subscriber station MS, it is started.

[0014]

Drawing 2 shows the overall flow chart of the method of performing the handover between frequency, or the handover between systems in a mobile communication system, when signaling connection or a communication interface is established. By step ST11, as the handover means HORM (HandOveR Means) formed in the network control means RNC or subscriber station MS mentioned above, network performance is supervised about the situation of the range (coverage) in which capacity/covering is possible. In step ST12, it determines about whether a handover is required on the whole in accordance with the standard the handover means HORM was judged by step ST11 to be. If required (in the case [Step ST12] of "Y"), a trigger will be carried out so that a mobile station may start implementation of measurement between frequency by step ST13. More specifically in step ST13, IF measurement trigger signal IFTS is outputted from the handover means HORM. As shown in drawing 1, the IF measuring means IFMM. In step ST13, A trigger is possible by mobile station evaluation handover (Mobile-evaluated-handover) trigger signal IFTS or network evaluation handover (Network-evaluated-handover) trigger signal IFTS.

[0015]

When required, in order to carry out the handover between frequency reliable at high speed, it is preferred to provide the output of trigger signal IFTS reliable inside the network control means RNC and/or mobile station MS. Of course, in order to provide the trigger procedure designed well, the number of the trigger conditions which carry out a trigger so that surveillance may be needed in step ST11 and IF measurement may be eventually carried out on other frequency or a system to mobile station MS is not one. Usually, while some conditions are supervised in step ST11, they need to be filled in order to output a trigger signal by step ST13. Such conditions can have too high an output from for example, the down-link connection with subscriber station from a network, or the uplink connection with network from a subscriber station, and/or a heavy load in a cell. For example, when a network measures uplink interference, supposing it detects the heavy load in a cell, a network tends to carry out the trigger of the handover to IF measurement therefore a different cell, or a different system. Similarly, when a send state deteriorates, the trigger of the mobile station MS will be carried out so that the output may be made to increase increasingly, therefore high power will show the necessity for IF measurement and a handover again.

[0016]

Conventional technology literature TS 25 231V0.3.0, technical-specification:3GPP (Third Generation Partnership Project); [Technical-specification group (TSG),] Wireless access network (RAN); in 3., 4., and Chapter 5.1.2, conventional various measurement trigger standards are described especially in the physical layer measurement in workgroup 1(WG1);IS95 standard, and July (it is hereafter called literature [1]), 1999. It is possible for both the network handover means HORM and the subscriber station handover means HORM to supervise the performance

of a radio link (RL), and to perform a handover demand in the mobile communication system indicated in literature [1]. For example, the network handover means HORM supervises a down-link by the measurement report from subscriber station MS. The network handover means HORM is supervised also about a traffic load again.

[0017]

the handover evaluated by mobile station MS as above-mentioned -- a mobile station evaluation handover and the handover which carries out abbreviated, is called MEHO and evaluated by a network -- a network evaluation handover -- abbreviated is carried out and it is referred to as NEHO. As shown in drawing 1, each of mobile station MS and the network control means RNC is able to start a handover according to the trigger situation which has the handover means HORM and is supervised, respectively. Four basic standards supervised during surveillance by step ST11 in conventional technology, While explaining below, as shown in above-mentioned literature [1], it is in an "excess of base station traffic load" state, an "excess of distance limitation" state, the state "in which pilot intensity was less than the threshold standard established beforehand", and an "excess of power level" state.

[0018]

About an "excess of base station traffic load" state, to the beginning, the network handover means HORM supervises the load in all the base station BS in the mobile communication system T1, and judges the necessity for a handover to it. And in order to equalize the load between all the base stations and to attain higher traffic efficiency, the IF measurement signal IFTS is outputted. For example, the network handover means HORM always outputs a trigger signal in step ST13, when the load of a base station exceeds the load threshold defined beforehand.

[0019]

About an "excess of distance limitation" state, a member handover means and/or the network handover means HOM suit the 2nd so that the necessity for a handover may be judged based on the distance surveillance of base station BS and subscriber station MS. The distance of a related base station and a subscriber station can be judged in a synchronous system. Therefore, when the measured distance exceeds the distance defined beforehand, in step ST13, trigger signal IFTS is always outputted.

[0020]

To the 3rd, about the state "where pilot intensity was less than the threshold standard established beforehand" a member handover means and/or a network handover means, It conforms so that it may judge based on surveillance less than the electric power threshold as which the necessity for a handover was beforehand determined to measurement pilot signal intensity. As shown in drawing 3-1 and drawing 4-1, in a modernistic mobile communication system, the data communications between base transceiver office RBS and subscriber station MS are carried out by transmitting data frame FR and transmission frame FR which comprise a control-section CP and data division DP. This is the right about the CDMA frame (drawing 3-1) and the TDMA frame (drawing 4-1) in a GSM system. Control-section CP comprises pilot signal PS at least, and is constituted with control-symbol CS of desirable further others. For example, each base station BS is able to transmit pilot signal PS of fixed electric power on the same frequency. Subscriber station MS can supervise the power level of the received pilot signal, and presumes the power loss on connection between base station BS and subscriber station MS. Pilot signal intensity is used for presumption of route loss, and when route loss is larger than the route loss threshold defined beforehand, the member handover means HORM outputs trigger signal IFTS in step ST13.

[0021]

To the 4th, about an "excess of power level" state a member handover means and/or a network handover means, In the necessity for a handover, member electric power adjustment module Pulse Amplitude Modulation (drawing 1 is shown in the inside of mobile station MS) answers the increase command in electric power from base station BS, and it suits so that the electric power in uplink of communication interface CC may be judged based on the surveillance of being unable to increase any longer.

[0022]

Drawing 5 a-d is two or more time-slot TS1... The adjustment of these former about the transmission power at the time of exchanging for base transceiver office (generally called node"B") RBS frame FR which consists of TS15 between subscriber station MSs is shown. Electric power adjustment module Pulse Amplitude Modulation in base transceiver office (node "B") RBS presets upper limit threshold PUP, the lower limit threshold PDWN, and offset value POFF to electric power. In the node B, the power offset value POFF is used with low-speed power controls, and a maximum and the lower limit thresholds PUP and PDWN are used with high-speed power controls.

[0023]

The low-speed power controls and high-speed power controls which are shown in drawing 5 b are performed according to the flow chart of drawing 5 c. Step P1 relevant to low-speed power controls (external-control loop) and P2 are performed by the RNC or MS side. In Step P1, the rate FER (or block error rate BLER) of a framing error is measured, and this measured FER (or BLER) is compared with a FER desired value (or BLER desired value) by Step P2. In Step P8, new signal interference ratio desired value SIR-target is obtained.

[0024]

As shown in drawing 5 d, a known relation (it simulated) exists between the logarithm of a delta_SIR_target value (dB) and the measured FER value. Predetermined "working area" exists between two threshold UL_delta_SIR_2 and UL_delta_SIR_1. This relation is simulated to known, i.e., beforehand. As shown in drawing 5 d, delta_SIR_target* is read depending on the logarithm (measured FER) of measured value. New SIR_target value SIR_target is calculated according to the following formulas.

In Step P8, SIR_target=SIR_target+delta_SIR_target* therefore an outside loop, or low-speed power controls always generate a new SIR_target value, when Step P1 and P2 are performed. A new SIR_target value is used by the high-speed power controls (internal loop) performed by the node B or MS side after that, respectively.

[0025]

In Step P5, SIR per slot (signal-to-interference ratio) is measured, and it is compared with a SIR desired value (present) from which the measurement SIR value was acquired at Step P8 by Step P4. If the measurement SIR value is larger than the present SIR desired value, a reduction command will be transmitted to mobile station MS / network, namely, the transmission-power-control parameter TPC will be set to TPC= "00" in Step P7.When the measurement SIR value is smaller than the SIR desired value (present) in Step P4, an increase command is transmitted to mobile station MS / network in Step P6 by setting the transmission-power-control parameter TPC to TPC= "11."

[0026]

The result of gradual adjustment of electric power P_{out} in down-link DL is obtained by low-speed power controls and high-speed power controls as illustrated by drawing 5 b. Since low-speed power controls perform Step P1 and P2 which calculate the frame error rate FER (or block error rate BLER) on every frame (or block), A new SIR-desired value is acquired by frequency lower than the high-speed power controls performed by Step P5, P4, P6, and P7 about each slot.

[0027]

Threshold P_{up} of offset value P_{off} and a high and low side and P_{dwn} are also used for electric power adjustment. For example, when exceeding threshold P_{up} of a side with high output power P_{out}, offset value P_{off} increases slightly, and when the electric power is smaller than threshold P_{dwn} of a low side, offset value P_{off} decreases slightly. Gradual adjustment of electric power is always performed in the power range between P_{dwn} and P_{up}. Since these value P_{off}, P_{up}, and P_{dwn} are merely used for the cause of a soft hand over, the relation beyond this with this invention does not have these, and, so, the explanation beyond this about this is omitted.

[0028]

as mentioned above, on the 4th "excess of power level" conditions, the node B (base station

BS) so that the electric power may be increased to subscriber station MS, [order and] If it reports that electric power adjustment module Pulse Amplitude Modulation in the node B answers increase command TCP in electric power, and the further increase in electric power cannot be found, the network handover means HORM may require measurement by publishing IF trigger signal.

[0029]

About four above-mentioned different conditions, there are many serious disadvantages and some of four explained conditions cannot even perform carrying out in the system (WCDMA) of future wide-band code-division multiple access.

[0030]

As opposed to the reference [1] having described the synchronous CDMA system about an IS-95 standard, Reference [2]:TS25.201 V2.1.0 and a third generation partnership project (3GPP); technical-specification group (TSG); wireless connection network (the physical layer - RAM; working group 1(WG1); --) [and] The version has described the asynchronous WCDMA system and the point-to-multipoint connection used especially there in June, 1999. Although the reference [1] is indicated, in a synchronous system [like], base station BS or subscriber station MS can still evaluate the distance between both (the 2nd trigger condition). This is possible at that in sync with a system clock (locked) with a precise chip rate in a pilot channel and all the channels. This is attained by using Global Positioning System (GPS) in a reference [1]. However, the distance evaluated for the multipass propagation delay between base station BS and subscriber station MS or shadowing may be mistaken. So, the 2nd condition "an excess of distance limitation" may be unable to be said to be very exact.

[0031]

In the 3rd conditions "pilot intensity is less than the threshold standard established beforehand", subscriber station MS must perform measurement which serves as a cause of IF measurement, therefore serves as a cause of a handover. Since subscriber station MS must perform average filtering of a pilot channel between predetermined measuring time, these continuous measurement of pilot signal intensity may shorten the life of the cell of a subscriber station remarkable. Since the reduction in a battery life has IF measurement in another frequency when [at which a subscriber station must perform] many measurement, for example, IF measurement trigger signal IFTS, is already published, etc., it should be avoided in all the environments. furthermore, moreover, by an air interface, subscriber station MS must report pilot signal intensity measurement in a certain form to base transceiver office RBS (node B) and the network control means RNC, and to them, This will make the interference level in the uplink UL, and the load of the signal dispatch in a network increase further. So, when used in relation to the 3rd conditions "pilot intensity is less than the threshold standard established beforehand", Evaluation of the load according to the 1st conditions of "an excess of a base station traffic load" may cause more signal dispatch for increase of the signal dispatch in a network air interface.

[0032]

So, some of these conditions are not used in a synchronous or asynchronous system, but a battery life becomes short, and the main disadvantages of the trigger mechanism of conventional technology are at the point that the load of the signal dispatch in a network increases with the interference level in the uplink UL.

[0033]

In drawing 2, IF (generated by subscriber station handover means HORM or network handover means HORM) measurement trigger signal IFTS is answered, and a subscriber station performs IF measurement with the time interval given in step ST21. As mentioned above, in order to perform the handover between frequency which is reliable at high speed, signal quality measurement in a target cell or a different system in frequency which is different in subscriber station MS, for example, [perform and] These things are reported to the network control means RNC so that the foundation may be made as for Lycium chinense to the signal quality measurement to which the determination of the handover is reported to the network control means RNC about to which cell the handover of the subscriber station MS will be carried out.

[0034]
Execution of IF measurement by subscriber station MS is not a trifling task so that it may mention later. For example, in CDMA or an FDMA system, the receiver of subscriber station MS usually, In order that a certain measuring time may enable measurement between frequency without the big loss of data in such a system busy therefore receiving information on the present frequency, it carries out somehow or other and must be made. Below, the conventional method for determining the time interval with which field measurement is performed is explained with reference to drawing 3-1, drawing 3-2, drawing 4-1, drawing 4-2, and drawing 6.
[0035]
As already mentioned above with reference to drawing 3-1, with a CDMA communication system, data communications are two or more time slot TS1..... It performs by exchanging data frame FR which comprises TS15. Each time slot has control-section CP and data division DP. It is also possible to perform data communications by compressed mode (called a slot mode), and to make some time about IF measurement as indicated to the reference [2] mentioned above, and as suggested also to step ST21' [of drawing 3-2], and drawing 3-1. That is [the data in which the network control means RNC is included in data division DP for this purpose is compressed], it is collected to a portion smaller than that of a frame, and has the compressed mode setting-out means CMSM which makes standby time part ITP as that result. Subscriber station MS is notified about transmission by compressed mode via the signal transmitted from the compressed mode setting-out means CMSM of the - network control means RNC, or a certain information, and has the determination CMDM, i.e., a compressed mode determination means to take shape, for operation by - and compressed mode. Supposing operation of such compressed mode is detected, subscriber station MS starts operation by compressed mode, will be step ST21" in drawing 3-2, and will perform IF measurement by standby time IT.
[0036]
In a CDMA system, concentration of such information is attained by reducing process gain G= chip / information bit =1/SF, for example, making diffusion coefficient SF small. From r=1/3 to r by which another possibility about concentration of information being attained how changes a channel coding method = it is made by changing into one half. Time interval IT by which IF measurement is performed for operation by compressed mode is generated by the IF measuring means IFMM of subscriber station MS.
[0037]
drawing 4-1 and step SC21 -- "' and ST21 -- "'' shows another possibility about having a time interval with which field measurement is performed how. Two or more TDMA time slot TS1 in a GSM system .... Specific time slot FMS of the frame which comprises TS-M is specified, and field measurement is performed in the FMP section. That is, in a GSM system, it has a predetermined field measurement slot by which data is not transmitted to subscriber station MS from the transmitter of a network control means or a base station.
[0038]
The further way about having a standby time interval how is indicated to the reference [1] about the case where the handover between systems should be performed. In this case, subscriber station MS does not perform measurement by another system, instead the pseudonoise PN sequence received by subscriber station MS on the same frequency as subscriber station MS has already communicated is transmitted in that another system as illustrated by drawing 6. When the electric power of this PN sequence exceeds predetermined time and a predetermined threshold as compared with other PN sequences, the handover between systems is performed.
[0039]
the network control means RNC giving a trigger to a mobile station and step ST13, and performing IF measurement, and as shown in drawing 2, drawing 3-1, and drawing 4-1, Directions are given to subscriber station MS on the frequency belonging to a different cell in which said IF measurement will be performed, or a different system. Subscriber station SS reports IF measurement to the network control means RNC within predetermined time. And in step ST22, it is determined whether a handover is possible for the network control means RNC in the selected frequency (a cell or a different system). for example, since it opts for a too much large

interference on the new frequency, If it is impossible, a network control means will choose a new target cell (frequency) in step ST23, and IF measurement will be repeated by subscriber station MS in step ST21. Furthermore, moreover, the network control means RNC can give a command to subscriber station MS, and can perform periodic search or search only for 1 time. Such a procedure is indicated to the reference [1] about the synchronous communications system, for example.

[0040]

In a certain system like CDMA2000. It is shown subscriber station MS not only can report IF measurement to a network control means, but when [how much long (in time) and] (time of onset) can perform now IF measurement of a request of subscriber station MS to the network control means RNC. Supposing the network control means RNC has the knowledge about a time interval that subscriber station MS has intention of execution of IF measurement, the network control means RNC will be transmitted by the network control means RNC, but. Some preparations for compensating with subscriber station MS the data frame which does not process in the time interval which performs the IF measurement can be made. That is, if the further preparation is not made, the data frame will actually be lost in the time interval in which subscriber station MS performs field measurement.

[0041]

One possibility is that the network control means RNC increases electric power before the repeat time or two or more repeat times or to the back. Since the error rate is always evaluated over two or more data frames, such an increase in electric power before and behind the repeat time enables the overall quality about an error rate to hold the demand of a mean error rate on the average level which does not exceed. On the other hand, a similar state also generates the subscriber station MS side. That is, subscriber station MS could not transmit a data frame in the repeat time. So, when subscriber station MS also increases electric power before and behind the determined measuring time, the possible frame which is not transmitted is compensated. So, receiving quality improves by the network control means RNC side the subscriber station MS side. However, an above-mentioned procedure provided with the given time interval in which mobile station MS will perform field measurement by step ST21 (generally this is used by CDMA2000 and IS'95), PN sequence transmission and compensation of the eliminated frame by the increase in electric power will show some big faults, when carrying out by a system, as still shown below.

[0042]

In addition, especially as for the procedure of WCDMA which performs field measurement relevant to operation by compressed mode, in the case of a system, there are the following disadvantages. Since subscriber station MS is provided diffusion coefficient SF in down-link DL with standby time interval IT which will perform field measurement about other systems, supposing it is made small, an available channelization code will decrease. That is, the hard capability of a CDMA system becomes small.

[0043]

on the other hand, the rate of channel coding -- fixed time -- since a CDMA system will perform service using the depth of interleaving which differs about the same radio link as a different coding mode if it becomes large, the device of a complicated numerals speed must be mounted in the network control means RNC.

[0044]

Furthermore, moreover, since the same data information is transmitted with a shorter time interval, i.e., a compressed data period, subscriber station MS must increase the output power, when measurement is performed for operation by compressed mode. If the output power of subscriber station MS and/or base transceiver office RBS is not enlarged, the performance will fall. However, this demand of increasing the peak power of subscriber station MS may suggest restriction of distance, supposing member MS has already transmitted by that maximum output power. Since the data field is not protected by even the same grade when a coding rate furthermore becomes low moreover, there is big danger rather than losing information. Therefore, since long time is needed for implementation of IF measurement while compressed data

transmission reduces quality by one side, a standby time interval is dramatically short and a handover becomes a low speed.
[0045]
The procedure using PN sequence transmission has the following disadvantages as shown in drawing 6. In this case, the existing mobile communication system of everything but all must be provided with the device which transmits PN sequence detected by subscriber station MS. This means the big expense for an employment person (following and taking to an end user). It will interfere in PN sequence further moreover used with another mobile communication system with the CDMA system, and it will reduce the capability and quality of data communications.
[0046]
The method stated to the last of making electric power increase before and behind a repeat time, when subscriber station MS wants to perform the handover between ******** on the boundary of a cell probably closely, When a cell (sector) presents a heavy load, and telephone speech quality is already very low, there is a disadvantage that there is a high danger that the frame loss by a repeat time will degrade the telephone speech quality.
[0047]
A subscriber station can determine a repeat time as inner time of data transmission from a network control means. Therefore, IF measurement cannot change with the cause of the debasement of connection.
[0048]
When the above-mentioned disadvantage provided with a time interval for IF measurement according to above-mentioned conventional technology is summarized, such a preparation of a time test interval, (For example, for the loss of a frame) A result of deterioration of a quality of service is brought, complicated (for inclusion of PN sequence generator) system reconstruction will be needed, or the battery life of subscriber station MS will be shortened (if electric power increases before and behind the time interval). A time interval is restricted by the standby time length in a compression time slot.
[0049]
(Outline of an invention)
The procedure for which IF measurement was mentioned above a trigger and for performing in the mobile communication system as above-mentioned, Since the battery lives of subscriber station MS are reduced (the specific trigger method use), the quality of service of data communications deteriorates (deficit of a frame) and a system configuration becomes complicated (inclusion of a PN series creating means), generally it is disadvantageous. Since IF measurement can perform only at intervals of the standby time under compressed mode operation, long time is required for execution of a handover. An object of this invention is to avoid the fault described especially at the end at least.
[0050]
Especially the purpose of this invention is to provide the subscriber station, the network control means, method, and mobile communication system which make IF measurement easy, maintaining the transmission quality.
[0051]
The mobile communication system with which this purpose has at least one base transceiver office and a network control means, It is the subscriber station (claim 1) included IF measuring means which suited so that IF measurement between frequency might be performed, It has a time interval signal detection means which detects IF repeat-time indication signal which shows the time interval of established connection between said subscriber station in transmission from said network control means, and said base transceiver office, The subscriber station conforming so that said IF measuring means may perform said IF measurement with said time interval shown in said IF repeat-time indication signal is solved.
[0052]
This purpose is a method (claim 13) for carrying out IF measurement between frequency again in the subscriber station of a mobile communication system which has at least one base transceiver office and a network control means, In a network control means, IF repeat time is

chosen during connection between said subscriber station and said base transceiver office, The step which transmits IF repeat-time indication signal which shows the time interval of said connection by which said IF measurement should be made by said subscriber station to said subscriber station from said network control means, It is solved also by the method of having a step which detects said IF repeat-time indication signal in said subscriber station, and a step which carries out said IF measurement in said subscriber station with said time interval of said connection shown by said IF repeat-time indication signal.

[0053]

At least one subscriber station which has IF measuring means which suited so that this purpose might carry out IF measurement between frequency again, It is a mobile communication system (claim 33) which has a network control means for performing said subscriber station and data communications during at least one a base transceiver office and connection, Said network control means chooses the time interval of said connection to which said subscriber station should carry out IF measurement, It has IF repeat-time selecting means which suited so that IF repeat-time indication signal which shows said time interval might be transmitted to said subscriber station, It has the time interval signal detection means which suited so that said subscriber station might detect said IF repeat-time indication signal which shows said time interval within transmission from said network control means, Said IF measuring means is solved also by the mobile communication system conforming so that said IF measurement may be performed with said time interval shown with said detected IF repeat-time indication signal.

[0054]

In order that this purpose may control again the data communications on the communication interface established between a subscriber station and at least one base transceiver office at least, While it is a network control means (claim 44) of a mobile communication system, and suiting so that said subscriber station may choose the time interval of the connection which should perform measurement, The network control means having IF repeat-time selecting means which suited so that IF repeat-time indication signal might be transmitted to said subscriber station is also solved.

[0055]

According to the 1st standpoint of this invention, it has IF selecting means as which a network control means chooses the time interval as which said channel with which said subscriber station should perform IF measurement was determined beforehand. This selected time interval defined beforehand is transmitted to a subscriber station in IF repeat-time indication signal which shows the selected time interval to that subscriber station defined beforehand.

[0056]

A subscriber station has a time interval signal detection means, in order to detect said IF repeat-time indication signal within transmission from a network control means. IF measurement is performed after that with the time interval with the subscriber station selected in the network control means defined beforehand. Therefore, it can be shown by the network what period subscriber station a subscriber station is attained to when and measures on another frequency. That is, IF repeat-time indication signal specifies the length of the time interval which should perform IF measurement in start timing and a subscriber station. It can be compensated whether in this selected time interval, degradation of the temporary transmission quality to which a network control means supplies a subscriber station is permissible, About degradation of the transmission quality which may happen, for example, the deficit of data, since it can do based on the time interval the network control means already judged that it is compensated after that, it is not necessary to care.

[0057]

According to the 2nd standpoint of this invention, a subscriber station and/or a base transceiver office supervise the quality of service on the established communication interface, and have the switching performance monitor means which suited so that the information on the quality of service might be transmitted to said network control means. In such a case, a network control means chooses said time interval of said communication interface defined beforehand based on the information on the quality of service to which it was reported from the switching

performance monitor means. If possible, a time interval is chosen with the time interval allowed temporary degradation of the quality of service resulting from said IF measuring means carrying out said IF measurement. It is that the network control means knows a priori what directions of the time interval to a subscriber station will always serve as a deterioration cause of the send state for as well as the strong point of such a procedure when a subscriber station actually performs IF measurement with this time interval. However, when it is checked that the network control means had pointed to the time interval which can permit temporary quality degradation, a network control means can be made for the preparations for offsetting this quality degradation in this selected time interval after that.

[0058]

According to the 3rd standpoint of this invention, data communications sensitive to delay are carried out between the base transceiver office on said established connection, and a subscriber station. When IF measurement is performed during data communications sensitive to delay, this suggests that the data slot (a part of frame) of the frame on connection is lost, i.e., aggravation of a quality of service. However, when a subscriber station and a network control means direct to increase the down-link of a communication interface, and the transmission power of a rise ring, respectively before the start of said time interval defined beforehand, and/or after the end of said time interval to a power regulating means, they can offset this quality deterioration. That is, although a loss of data always occurs in data communications sensitive to delay in the time interval with which IF measurement is performed, an average error ratio is kept the same for it to be convenient.

[0059]

According to the 4th standpoint of this invention, data communications sensitive to a deficit are carried out between a base transceiver office and a subscriber station. The information flow between a network and a subscriber station is not usually so dense between types sensitive to the deficit of a connection service, and the buffer used by the network side during the connection is less than the specified threshold. In such a case, in the time interval that a transmission buffer means is not thoroughly filled by send data, the network can demand to measure on other frequency/systems to a subscriber station.

[0060]

That is, it is possible to store temporarily said some said transmission [by which said IF measuring means is performed by IF measuring means of a subscriber station] data by which the transmission buffer in a network should be transmitted into said time interval at least in said selected, selected time interval. The data (a time slot, for example, the time slot in GSM, or data frame of WCDMA) stored further is transmitted to a subscriber station after the end of a time interval so that a loss of data may not occur.

[0061]

According to the 5th standpoint of this invention, with use of the transmission buffer means about the connection service of a form sensitive to a loss, a network control means reduces the data transmission rate in a time interval, and after said time interval is completed, it suits so that a data transmission rate may be made to increase again. It is avoided that a buffer means is quickly fulfilled by making it such since the speed which data reaches is reduced.

[0062]

According to the 6th standpoint of this invention, it is possible to carry out re-scheduling with use of the transmission buffer means by the 4th and 5th standpoints, using other buffer means, in order for a network control means to make the capacity of the intermediate memory of transmission data increase. In order to make the buffer size of a transmission buffer means increase and to decrease temporarily the buffer size of other buffer means which are not used into a time interval, it is also possible to perform dynamic buffer scheduling which used other buffers. It restricts, when not performing buffer re-scheduling or dynamic buffer schedule management, either, in order to make transmitting buffer size increase, and finally the deleting means of a network control means deletes at least one copy of the data which should be transmitted into said time interval.

[0063]

According to the 7th standpoint of this invention, the data communications between a base transceiver office and a subscriber station are performed in the compressed mode operation by which some data is compressed into a time slot. And IF measurement is carried out in the standby time portion of the data frame from which it is the time interval preferably shown in IF repeat-time indication signal, and data communications are performed by compressed mode. Therefore, it is requested when the network should measure the frequency of others [subscriber station / of how much / length] to a subscriber station in this case. It is usable as a complement of compressed mode in this.

[0064]

The another advantageous example and improvement point of this invention will be obtained from the dependent claim. This invention can include the example separately acquired from the combination of description and/or the standpoint by which the claim is carried out, and the feature in this specification and/or an attached claim.

[0065]

Hereafter, the example of this invention is described with reference to an accompanying drawing.

Here, please care about that an identical or similar reference number shows an identical or similar step and function through a drawing. Especially each part explained to conventional subscriber station MS and the conventional network control means RNC in drawing 2 exists also in the example of this invention. Please care about that this invention is not limited to specific CDMA mentioned above, WCDMA, D-AMPS, or a GSM system. If it puts in another way, this invention is applicable to the arbitrary telecommunication systems which need to carry out a handover between frequency, a cell, and a different system.

[0066]

(Principle of an invention)

Please care about that a handover procedure and IF measurement are performed [at both the time of setting out of communications system CC, or the time of signaling connection only being set to mobile station MS under non-active mode operation].

[0067]

Drawing 7 shows the fundamental block diagram of the mobile communication system T1 by this invention. Mobile station MS has the time interval signal detection means TSIDM which suited so that IF repeat-time indication signal TIIS which shows the time interval which was transmitting from the network control means RNC and was defined beforehand might be detected in addition to each part already shown in drawing 1 by a conventional example. The network control means RNC has IF repeat-time selecting means TISM which suited so that said time interval of said connection in which said subscriber station MS should perform said IF measurement defined beforehand might be chosen. As shown in drawing 7, the time interval selecting means TISM transmits said IF repeat-time indication signal TIIS to said subscriber station MS.

[0068]

Therefore, it is possible by using the time interval selecting means TISM within the network control means RNC, and the time interval signal detection means TSIDM in subscriber station MS to specify a time interval from the network control means RNC to subscriber station MS. Therefore, subscriber station MS does not need to perform a judgment of any kind itself, and it can trust thoroughly that a time interval is suitable based on the directions from a network control means.

[0069]

As shown in drawing 8, IF measuring means conforms in step ST13 of drawing 8 fundamentally so that IF measurement trigger signal IFTS which the handover means HORM within subscriber station MS or the network control means RNC generates may be answered and said IF measurement may be performed. In Step S211, the network control means RNC is a time interval with which IF measurement should be performed.

The network control means RNC determines the time interval which determines that temporary quality degradation can be permitted.

This time interval is transmitted to mobile station MS in step ST211.

[0070]
In step ST212, the IF measuring means IFMM performs said IF measurement with said time interval which was directed into IF repeat-time indication signal TIIS transmitted from said detected network control means and which was defined beforehand. Other steps in drawing 8 are the same as that of drawing 2.
[0071]
As the conventional example about compressed mode operation was explained, in compressed mode operation, only short standby time interval IF is available to execution of IF field measurement. However, according to the principle of this invention, the planned time interval which can permit temporary quality degradation is used. So that the quality degradation in which a network control means is constant even when IF measurement is carried out may be accepted or it can compensate by the network control means or a subscriber station, Since the subscriber station is able to trust having determined the suitable time interval thoroughly, when a subscriber station receives directions of this time interval, it can start IF measurement promptly. That is, in the inside of the time interval in which a subscriber station carries out IF measurement, since the data exchange between a subscriber station and a network is impossible, temporary deterioration of the quality of service resulting from IF measurement generates it.
[0072]
However, as for a network control means, it is possible for deterioration of such a quality of service to determine autonomously the time interval which does not bring about evil as the whole transmission. Usually, the time interval directed by a network control means is below the standby time interval in compressed mode operation. Since the member does not need to wait for the start of compressed mode operation, it is possible to make a handover decision between systems between more nearly high-speed frequency so that it is [therefore] possible to perform IF measurement a little early. This is because it has the capability to perform measurement other than the measurement execution only using compressed mode art, when a subscriber station uses the proposed method. That is, in some situations, it is difficult to determine not to lose connection early. Therefore, unless quality degradation is as severe as transmission is interrupted, a more nearly high-speed handover is attained in IF measurement that it can perform [as a result] still promptly.
[0073]
Preferably, IF repeat-time indication signal TIIS is transmitted within said IF measurement trigger signal IFTS from said IF repeat-time selecting means TISM. That is, the network control means RNC is able to determine first fundamentally that there is the necessity for a handover, and that the subscriber station needs the trigger of IF measurement. However, the network control means RNC can suspend transmission of a trigger signal until the time interval with which IF measurement should be performed is determined. And it is possible to also convey the information about the time interval as which IF measurement trigger signal was chosen, for example by both both directions of a trigger signal and a time interval becoming ability ready for sending to a subscriber station.
[0074]
Therefore, when a network is determined about when a subscriber station should measure another frequency in the same system or other systems in which period (or for two or more of which terms), A subscriber station has the capability to carry out these measurement, even if the quality of service (QoS) of the present service (singular number or plurality) deteriorates temporarily.
[0075]
In order to enable suitable determination of a time interval, the network control means RNC (and/or, subscriber station MS) supervises quality-of-service QoS of the established communication interface, It is possible to have the switching performance measuring means CQMM which suited so that the information on quality-of-service QoS might be transmitted to the network control means RNC. The switching performance monitor means CQMM may be arranged in base transceiver office RBS again. The switching performance monitor means CQMM supplies some information on a quality of service to the time interval selecting means TISM.

Therefore, if possible, a time interval can be chosen with the time interval allowed temporary deterioration of the quality of service by said IF measuring means IFMM performing said IF measurement.

[0076]

Therefore, when a temporary fall of quality-of-service QoS in a communication interface is allowed as above-mentioned, subscriber station MS can use degradation of this service for measurement between frequency. The network can determine one or more time intervals allowed the fall of quality-of-service QoS, and can perform measurement between frequency in the time interval. A network control means has knowledge not only about the switching performance about both uplink and a down-link but about a system configuration. Therefore, the network control means has the best possibility for determining just whether a subscriber station should perform measurement about another frequency, and when ** should carry out the measurements of length of how much. Of course, a switching performance is good, and when other frequency or systems which measure do not exist, subscriber station MS does not need to carry out a handover.

[0077]

Of course, the principle of this invention needs to direct in which interval (one or more) subscriber station MS should perform measurement between frequency when via IF measuring time indication signal TIIS with which the network control means was detected. As mentioned above, this information may be included in a trigger signal.

[0078]

The switching performance monitor means CQMM transmits the information on a quality of service to a network control means. The switching performance monitor means CQMM is ability ready for sending also about the information on the intact buffer used for the connection in a network. That is, in any communications systems, before being transmitted to a subscriber station, the transmission buffer which stores send data temporarily is used. (It has been arranged at the subscriber station, the base transceiver office, and/or the network control means) The switching performance monitor means CQMM has again the knowledge of system configurations, such as other frequency in the system in the field where the subscriber station established connection, and other systems. Therefore, based on all this information, the time interval selecting means TISM can choose the best time interval which temporary deterioration of the transmission quality can still permit.

[0079]

The network control means can perform the increase in electric power at the time of the preparation for offsetting temporary degradation of transmission resulting from IF measurement, for example, the start of a time interval, and an end so that it may explain below with reference to the example of this invention. Instead, transmitting buffer size can also be adjusted (buffer size is increased or an additional buffer is used), In order to reduce the coming data volume and to reduce the data volume which needs to be stored in a transmission buffer, it is also possible to reduce a transmission rate in the time interval defined beforehand.

[0080]

(The 1st example)

Generally, in a communications system, it is distinguishable in service of a different form, i.e., service sensitive to delay, and service sensitive to a deficit. When service form is sensitive to delay, it is more important also for a certain ****** than having no error that the transmitted information is received on time. For example, a sound is transmission sensitive to delay.

[0081]

On the other hand, when service form is sensitive to a deficit, it is important that information is received without exceeding the error which can correct the decryption machine within a subscriber station or a network control means. When the packet contains the unrecoverable error, the packet is translated as what was lost. For example, web browsing will reach late, although information will reach early, but since it is not related, it is service sensitive to a deficit.

[0082]

The 1st example of this invention is related with how minimization or reduction of quality-of-service QoS usable to the measurement between frequency to the case of service sensitive to delay is performed.

[0083]

When transmission sensitive to delay is carried out during the communication interface between subscriber station MS and base transceiver office RBS (or network control means RNC), a subscriber station has deleting means DEL which deletes the data which reached into said selected time interval from base transceiver office RBS. Such a situation For example, specific time for the network control means RNC to originate in some standards (for example, the poor measurement report by a high frame error rate and/or mobile station, low received signal strength, and/or the bad signal-to-interference ratio SIR) at subscriber station MS and a period, It generates, when it requires and subscriber station SS and base transceiver office RBS establish voice connection, i.e., service sensitive to delay, so that measurement about other frequency or systems may be performed to subscriber station MS. Probably this will suggest the slot (path of a frame) on the present connection, or the loss of the frame. Such a frame is because IF measurement needs to be deleted by the subscriber station in the time interval performed. In order to offset temporary deterioration of this quality of service, said network control means RNC and/or said subscriber station MS, respectively, It can have power control means Pulse Amplitude Modulation for increasing down-link DL of communication interface CC, and the transmission power on the uplink UL before the start of said time interval defined beforehand, and/or after an end, respectively.

[0084]

For example, when set beforehand, in order for the network control means RNC to determine that said subscriber station MS should perform IF measurement and to make the transmission power on uplink increase between the ten following data frames after 10 data frames, (Setting for the procedure for example, using transmission-control flag TCP) It is ability ready for sending in subscriber station MS about an indication signal. A network control means makes the transmission power on its down-link DL increase again.

[0085]

Simultaneously, a network control means directs the transmission power to make it increase about two or more data frames (for example, 10) after the end of the time interval directed to subscriber station MS. When a time interval is completed, a network control means makes the transmission power on its down-link similarly increase again. Such electric power adjustment can be carried out in the high speed and low-speed power-controls cycle which were mentioned above about drawing 5.

[0086]

Of course, since subscriber station MS is busy with performing IF measurement even if the transmission power on uplink and a down-link is increased before and after a time interval, the period when data is not transmitted or received still exists in the inside of the time interval. Therefore, an error rate increases fundamentally. However, the rise of this error rate is compensable by the increase in transmission power. As for an error rate, it is only calculated about the average of many data frames. Therefore, degradation of the transmission quality between IF repeat times is compensable by making transmission power increase in the beginning of a time interval, or the last. Therefore, overall deterioration of a quality of service does not take place.

[0087]

(The 2nd example)

According to the 2nd example of this invention, when data communications sensitive to a loss are performed between base transceiver office RBS and subscriber station MS, fall minimization of the quality of service between measurement between frequency is carried out.

[0088]

As shown in drawing 7, in a network and/or the network control means RNC, the transmission buffer means BUF of prescribed size is always used for the intermediate memory before send data is transmitted on the down-link of said communication interface. In the case of form with a

connection service form sensitive to a loss, the information flow between the network control means RNC and subscriber station MS is not dense, and the transmission buffer means BUF used during the connection does not reach the usually specified threshold. Therefore, the network control means RNC can be required as measuring other frequency/systems in a predetermined time interval of subscriber station MS, Between the time intervals as which the network/subscriber station was specified, in transmitting / receiving more information, the transmission buffer BUF memorizes temporarily said at least some of send data which should be transmitted between the time interval. The network control means RNC transmits the stored data to subscriber station MS after the end of said selected time interval. That is, a network control means or the subscriber station can use the buffer space of the reserve of the transmission buffer means BUF in this case for the intermediate memory of send data.

[0089]

Therefore, when service is sensitive to a loss, there must not be any data lost. Since there is no meaning in the data communications between the subscriber station and network control means (base transceiver office) between IF repeat times as which it was chosen in any cases, a network control means only delays data transmission, and performs intermediate memory for the transmission buffer means BUF.

[0090]

Instead, a temporary quality-of-service fall between predetermined time intervals can be compensated by changing access speed before and behind the time interval. Namely, in said time interval to which said IF measurement is performed by said IF measuring means IFMM, To the intermediate memory before send data is transmitted on down-link DL of said communication interface. The transmission buffer means BUF of prescribed size is used, and the network control means RNC and/or subscriber station MS reduce a data transmission rate, and a data transmission rate is again raised after the end of said time interval. The change means within the network control means RNC processes the access speed change for a communication interface.

[0091]

The case where the further possible send data of a network control means (or base transceiver office RBS) being promptly processed by the present transmission buffer means BUF (storing) is transmitted / received instead may happen. In such a case, the network control means can perform the re-schedule of buffer size using other additional transmission buffer means BUF'. That is, the network control means RNC suits so that more storage capacities may be provided and a re-schedule may be performed using other buffer means BUF' for the intermediate memory of send data unreceivable from/transmitted to a subscriber station between the selected time intervals. That is, it is used for storing of the send data which is not lost between time intervals for additional buffer means BUF' to perform IF measurement, either.

[0092]

In order to make the buffer size of said transmission buffer means BUF increase and to decrease the buffer size of another buffer means BUF' in the time interval, The network control means RNC is able to perform a dynamic buffer schedule using other buffer means BUF'. That is, some buffer means BUF which are not used between said selected time intervals and BUF' can be used for the intermediate memory of data. Therefore, it is possible for any data not to be lost but to transmit to a subscriber station / base transceiver office after the end of said time interval.

[0093]

Since a network/subscriber station copes with the high peak of data flow, data may be discarded. That is, when the storage capacity of all the buffer means BUF and BUF' is used up thoroughly, there is no choice except deleting at least some data which should be transmitted into said time interval. Therefore, subscriber station MS and/or the network control means RNC have a means for deleting at least some data which should be transmitted.

[0094]

Of course, the buffer size of a network control means/subscriber station must be less than a specific threshold, before the command of this network with performing measurement on another frequency/system to subscriber station MS is attained. That is, when the buffer by which normal

use is carried out is already full, there is no chance to suspend further the send data which cannot carry out the night message of the predetermined time interval. Even if buffer size is less than the predetermined threshold, rapid increase of the data volume [like] which the buffer in a network will overflow may take place. In such a case, dynamic assignment of the surplus buffer space using another buffer means BUF' is performed. As for this, the network control means RNC knows how many each buffers are filled.
If needed, buffer size is realizable, although re-assignment is possible therefore.

[0095]
According to [above-mentioned passage] the 1st and 2nd examples of this invention, said subscriber station performs IF measurement, and since the data transmission/reception between a subscriber station and a network are impossible, the network control means RNC chooses a predetermined time interval as that by which the quality-of-service fall of a communication interface is performed.
[0096]
However, since the network control means knows when a time interval will occur, it can be made for the preparations for raising the whole quality of service again. In the case of both data communications (the 1st example) sensitive to delay, and data communications (the 2nd example) sensitive to a deficit, this is feasible. That is, in spite of the fact that IF measurement is performed in a long-term time interval, in order that all the increases in transmission power before and behind the frequency measurement period for oppressing the fall of quality-of-service QoS, the dynamic buffer re-assignment, and gear change procedures may raise a quality of service on the average, it is used.
[0097]
Hereafter, the 3rd example of this invention to which a flow control is performed is described.
(The 3rd example)
According to the 3rd example of this invention, a network control means uses neither the increase in electric power nor re-assignment nor a gearbox style, in order to maintain on the level which can permit a quality of service.
[0098]
the ratio between the data frame to which IF handover means HORM was transmitted according to the 3rd example of this invention, and the received data frame -- RF is judged and it communicates with the transmission ratio judging means TRDM which suited so that the time concerning the judgment might be measured. When this ratio reaches a specific level, it becomes possible to direct that a network measures on other frequency/systems to subscriber station MS. However, this necessary condition may be insufficient for directing execution of measurement to subscriber station MS.
[0099]
For example, when a ratio reaches a specific level, the network can assume temporarily (between time intervals) rightly the data which a transmission buffer means BUF by which it is used now should always transmit after the end of a time interval that a data transmission rate is low to a storable grade. The network control means RNC can combine this with dynamic buffer assignment. For example, when the network control means RNC detects that the transmitting ratio (and/or, receiving ratio) exceeded the predetermined threshold, this always means the thing it will become impossible for the transmission buffer means used now to store temporarily no send data in a predetermined time interval for. Therefore, immediately after detecting an excess of transmission/receiving ratio, the network control means RNC performs the re-schedule of available buffer size automatically using other buffer means BUF' within the network control means RNC.
[0100]
The network control means can combine this with the transmission speed change in a time interval. Even if it is a case where big transmission/receiving ratio exists, it is determined that the network control means RNC will decrease the transmission speed in a time interval to the beginning, When this is also insufficient for saving all the data in a buffer means temporarily, it is

also possible to perform further the re-schedule which used other buffer means.
[0101]
Therefore, in the case of data communications sensitive to a loss, it is also possible to always perform compensation of the data frame in which a network control means cannot be transmitted between time intervals, but a quality of service is reduced, and it deals.
[0102]
(The 4th example)
According to the 4th example of this invention, a selectable time interval is determined according to the principle and/or the 1st, 2nd, or 3rd example of this invention in IF measurement. That is, a time interval is specified beforehand and transmitted to subscriber station MS by the network control means. Temporary aggravation of a quality of service is compensated by the measure made by the subscriber station (it is sensitive to a loss or a difference in the case of data communications sensitive to delay), and a network control means.
[0103]
According to the 4th example of this invention, the data communications between base transceiver office RBS and subscriber station MS are feasible by transmitting data frame FR in compressed mode operation. As mentioned above, in compressed mode operation, data is compressed into a time slot and the compressed mode judging means CDDM in subscriber station MS can detect this compressed mode operation. In the 4th example of this invention, IF measurement is feasible in two or more time slots (or data frame) directed with IF repeat-time indication signal ITTS, and two or more standby time portions of the data frame from which data communications are performed by compressed mode. That is, according to the 4th example of this invention, a network notifies to subscriber station MS about when and frequency **** arm measurement of the length of how much others should be performed, and this is used as what complements compressed mode.
[0104]
That is, after compressed mode operation is detected, in a standby time portion, IF measurement is performed first, and IF measurement is continued in a predetermined time interval as the directions from the network control means RNC after that. This is possible also for carrying out so that standby time may be promptly used instead of the time interval as an addition, if IF measurement is started in a predetermined time interval conversely, i.e., first, again and compressed mode operation is detected.
[0105]
When the worst, in spite of the increase in electric power (the 1st example), buffer space assignment or a re-schedule, speed adaptation (the 2nd example), and a transmission ratio judging (the 3rd example), All the buffers in a network fill and the excess data beyond it will be discarded within the network, when a network does not have sufficient buffer space for temporary maintenance of send data. However, aggravation of the quality of service which a buffer is not filled thoroughly, and a little data is only discarded, and cannot usually be compensated again is little.
[0106]
(Industrial availability)
The art concerning the principle of this invention and the 1st thru/or a 4th embodiment mentioned above avoids the problem of the conventional technology that aggravation of a quality of service must be accepted, in compressed mode operation as mentioned above. That is, since it is known within a network when aggravation of a quality of service occurs, it is possible, although deterioration of a planned quality of service is permitted in the mobile communication system by this invention to cope with it so that quality-of-service aggravation can be compensated. Therefore, aggravation of a quality of service is not generated.
[0107]
In arbitrary mobile communication systems, such a procedure is available, and is not restricted to any specific standards. Therefore, this invention can be used with a GSM system, WCDMA, or a CDMA system. This invention is not restricted to the specific example and example which were described in this specification. The expert can devise the further example, variation, and

derivative of this invention based on the art indicated here. The example mentioned above only constitutes the desirable mode of this invention so that an artificer may think now.
[0108]
This invention can include the example which comprises a function of the claim separately charged in the function and/or claim which were independently explained in this specification as above-mentioned.
The reference number in a generic claim achieves a duty only for the purpose of explanation, and does not limit scope of protection.
[Brief Description of the Drawings]
[Drawing 1]
They are at least two different mobile communication systems T1 and a figure showing a general general view of the conventional telecommunication system TELE which has T2.
[Drawing 2]
It is a flow chart for performing between the frequency in telecommunication system TELE shown in drawing 1, and/or the handover between systems.
[Drawing 3-1]
It is a figure showing the data frame at the time of compressed mode operation being used, and the composition of a time slot.
[Drawing 3-2]
It is the same flow chart as drawing 2 at the time of the compressed mode operation shown in drawing 3-1 being used.
[Drawing 4-1]
GSM etc. are the figures in the conventional TDMA mobile communication system showing regulation of a field measurement time slot.
[Drawing 4-2]
It is the same flow chart as drawing 3-2 in case field measurement is performed in a specific field measurement time slot as shown in drawing 4-1.
[Drawing 5 a]
It is a figure showing the conventional electric power adjustment procedure between subscriber station MS and the node B (base transceiver office RBS).
[Drawing 5 b]
It is a figure showing gradual adjustment of a down-link DL output.
[Drawing 5 c]
It is a figure showing the low-speed power controls and high-speed power controls which are obtained as a result of gradual change of the output in drawing 5 b.
[Drawing 5 d]
It is a figure showing mapping of the rate FER of a measurement framing error, or block error rate BLER and a delta_SIR_target value.
[Drawing 6]
It is a figure showing the handover procedure about transmission of the PN series from PN series generator PNG for the handovers between systems.
[Drawing 7]
They are subscriber station MS by this invention, and a fundamental block diagram of the network control means RNC.
[Drawing 8]
It is the same flow chart as drawing 2 containing step ST211 according to the principle of this invention, and ST212.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

(Technical field to which an invention belongs)
This invention relates to the subscriber station, network control means, and method of performing measurement between the frequency (inter-frequency) in a mobile communication system. This invention relates to the mobile communication system with which such a subscriber station, a network control means, and a method are used again.
[0002]
When the transmission state of the connection (a communication interface or signaling connection) between a subscriber station and a base transmitting station is supervised in a mobile communication system, for example, a transmission state deteriorates so that details may be explained below, the necessity between frequency or for the handover between systems is detected. If the necessity between frequency or for the handover between systems is detected, in order to show this necessity, the measurement trigger signal between frequency will be generated, and the measurement between frequency to different frequency from frequency present in use will be started. When a trigger signal is answered, measurement between frequency is performed about one or more different frequency and suitable new frequency is found, between actual frequency or the handover between systems is performed. Henceforth, even if the word "handover" is a case where it does not indicate clearly, it expresses between frequency or the handover between systems.
[0003]
When connection is established between a base transmitting station and a subscriber station, even if it is a case where only the subscriber station and signal connection of an active mode are established, In the connection, some data traffic always exists, and a subscriber station and the network must perform measurement between frequency, when there are no data communications. This is because some data which probably communicated the connection top will be lost if measurement between frequency is not performed. Other important viewpoints are how to be [when] generation **** about the measurement trigger signal between frequency by a network in order to start measurement between frequency. However, the measurement between frequency itself should care about answering the measurement trigger signal between frequency and always performing by a subscriber station.
[0004]
The problem which time interval this invention should use in order to perform measurement between these frequency in a subscriber station especially is solved.
Hereafter, the shortening notation is carried out with "IF" between frequency.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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PRIOR ART

(Background art)
Drawing 1 shows a general general view of at least two different mobile communication systems T1 and telecommunication system TELE which has T2 about the conventional method for carrying out the trigger of the IF measurement in a mobile communication system. For example, the subscriber station which is mobile station MS can operate with the 1st mobile communication system T1, and operates also in the 2nd mobile communication system T2. each -- a mobile communication system -- T -- one -- T -- two -- an inside -- a mobile station -- MS -- differing -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- and -- C -- one - C -- six -- moving about -- things -- being possible . By a different handover standard, mobile station MS performs the handover between systems from /to the system of the handover between frequency within the same system, and another side. Are equally applicable to this invention carrying out the trigger of the handover between frequency within the same system, and/or the handover between systems good here, Drawing 1 should only care about that the two mobile communication systems T1 and T2 are shown as an example from which both handover procedure of them may arise.
[0006]
To drawing 1, as an example of the 1st mobile communication system T1, the network control means RNC (Radio Network Controller), At least one base transceiver office RBS and RBS' (in WCDMA, called a base transceiver station), At least one subscriber station MS (Mobile.) Station -- and -- a large number -- overlap (probably) -- having carried out -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- having -- WCDMA (Wideband Code Division Multiple Access) -- or -- CDMA (Code.) A Division Multiple Access communications system is shown.
[0007]
An example of the 2nd mobile communication system T2 GSM (Global System for Mobile Communications), It is a communications system according to PDC (Personal Digital Cellular) and a D-AMPS (Digital-Advanced Mobile Personal Service) standard.
[0008]
In drawing 1, an example of a GSM system is shown as the 2nd mobile communication system T2. However, it should care about that this invention is not fundamentally limited to an above-mentioned system applicable to the digital cellular system of arbitrary forms therefore. The GSM system shown in drawing 1 has the conventional base station controller BSC, at least one mobile-communication-exchange MSC, and the gateway mobile-services switching center GMSC. Service is provided for mobile station MS by two or more base transceiver offices BTS in cell C1-C6 with movable mobile station MS.
[0009]
The network control means RNC of a WCDMA system in drawing 1 is connected to the gateway mobile-services switching center GMSC of a GSM system via a UMSC unit.
[0010]
the -- one -- and -- the -- two -- a mobile communication system -- T -- one -- T -- two -- being geographical -- arrangement -- responding -- the -- one -- a mobile communication

system -- T -- one -- a cell -- S -- one -- S -- two -- S -- three -- S -- one -- ' -- S -- three -- ' -- again -- the -- two -- a mobile communication system -- T -- two -- a cell -- C -- one - C -- six -- perfect -- or -- partial -- it may overlap . Of course, if mobile station MS performs a handover between systems, the mobile station MS will be able to operate according to use of the 1st and 2nd mobile communication systems.

[0011]

One reason for performing between frequency or a handover between systems in telecommunication system TELE in drawing 1 is based on a reason (coverage reasons) for being related with a range which can be covered. this -- not only the 1st communications system -- what kind of -- others -- a system also depends all the geographical regions, for example, a hot spot of UMTS, on a fact that it cannot cover thoroughly. Some cells in a mobile communication system may be operating on frequency inapplicable to an adjacent cell. Therefore, it becomes possible by making mobile station MS or the network control means RNC carry out either a handover between frequency, or a handover between systems to use mobile station MS in a larger field, without interrupting communication.

[0012]

Another reason for performing a handover is a reason (capacity reasons) for being related with capacity. Either this mobile communication system or other mobile communication systems may receive a heavy load occasionally, therefore the handover between systems is needed in this case. Similarly connection is established on specific frequency with mobile station MS, and it must stop having to use another frequency after that. This another frequency exists in the inside of the same cell, or other cells, and, generally [all] is called the handover between frequency. As shown in drawing 1, measurement between frequency (required for the handover between frequency and/or the handover between systems) is always performed by the measuring means IFMM between frequency provided in mobile station MS.

[0013]

The network control means RNC has the call flag transmitting means PFSM which transmits a call flag to mobile station MS, when the signaling communication link is already established between subscriber station MS and the network. For example, when mobile station MS is started and it registers with the network, a subscriber station is in having existing registered and non-active mode operation. Standby-operations means SOM maintains a subscriber station in non-active mode operation. In such non-active mode operation, operation of subscriber station MS is suspended at the time of the call flag PF reception from the network control means RNC, i.e., the call to subscriber station SS, and when a communication interface is set to subscriber station MS, it is started.

[0014]

Drawing 2 shows the overall flow chart of the method of performing the handover between frequency, or the handover between systems in a mobile communication system, when signaling connection or a communication interface is established. By step ST11, as the handover means HORM (HandOveR Means) formed in the network control means RNC or subscriber station MS mentioned above, network performance is supervised about the situation of the range (coverage) in which capacity/covering is possible. In step ST12, it determines about whether a handover is required on the whole in accordance with the standard the handover means HORM was judged by step ST11 to be. If required (in the case [Step ST12] of "Y"), a trigger will be carried out so that a mobile station may start implementation of measurement between frequency by step ST13. More specifically in step ST13, IF measurement trigger signal IFTS is outputted from the handover means HORM. As shown in drawing 1, the IF measuring means IFMM. In step ST13, A trigger is possible by mobile station evaluation handover (Mobile-evaluated-handover) trigger signal IFTS or network evaluation handover (Network-evaluated-handover) trigger signal IFTS.

[0015]

When required, in order to carry out the handover between frequency reliable at high speed, it is preferred to provide the output of trigger signal IFTS reliable inside the network control means RNC and/or mobile station MS. Of course, in order to provide the trigger procedure designed well, the number of the trigger conditions which carry out a trigger so that surveillance may be

needed in step ST11 and IF measurement may be eventually carried out on other frequency or a system to mobile station MS is not one. Usually, while some conditions are supervised in step ST11, they need to be filled in order to output a trigger signal by step ST13. Such conditions can have too high an output from for example, the down-link connection with subscriber station from a network, or the uplink connection with network from a subscriber station, and/or a heavy load in a cell. For example, when a network measures uplink interference, supposing it detects the heavy load in a cell, a network tends to carry out the trigger of the handover to IF measurement therefore a different cell, or a different system. Similarly, when a send state deteriorates, the trigger of the mobile station MS will be carried out so that the output may be made to increase increasingly, therefore high power will show the necessity for IF measurement and a handover again.

[0016]

Conventional technology literature TS 25 231V0.3.0, technical-specification:3GPP (Third Generation Partnership Project); [Technical-specification group (TSG),] Wireless access network (RAN); in 3., 4., and Chapter 5.1.2, conventional various measurement trigger standards are described especially in the physical layer measurement in workgroup 1(WG1);IS95 standard, and July (it is hereafter called literature [1]), 1999. It is possible for both the network handover means HORM and the subscriber station handover means HORM to supervise the performance of a radio link (RL), and to perform a handover demand in the mobile communication system indicated in literature [1]. For example, the network handover means HORM supervises a down-link by the measurement report from subscriber station MS. The network handover means HORM is supervised also about a traffic load again.

[0017]

the handover evaluated by mobile station MS as above-mentioned -- a mobile station evaluation handover and the handover which carries out abbreviated, is called MEHO and evaluated by a network -- a network evaluation handover -- abbreviated is carried out and it is referred to as NEHO. As shown in drawing 1, each of mobile station MS and the network control means RNC is able to start a handover according to the trigger situation which has the handover means HORM and is supervised, respectively. Four basic standards supervised during surveillance by step ST11 in conventional technology, While explaining below, as shown in above-mentioned literature [1], it is in an "excess of base station traffic load" state, an "excess of distance limitation" state, the state "in which pilot intensity was less than the threshold standard established beforehand", and an "excess of power level" state.

[0018]

About an "excess of base station traffic load" state, to the beginning, the network handover means HORM supervises load in all the base station BS in the mobile communication system T1, and judges the necessity for a handover to it. And in order to equalize load between all the base stations and to attain higher traffic efficiency, the IF measurement signal IFTS is outputted. For example, the network handover means HORM always outputs a trigger signal in step ST13, when load of a base station exceeds a load threshold defined beforehand.

[0019]

About an "excess of distance limitation" state, a member handover means and/or the network handover means HOM suit the 2nd so that the necessity for a handover may be judged based on distance surveillance of base station BS and subscriber station MS. Distance of a related base station and a subscriber station can be judged in a synchronous system. Therefore, when measured distance exceeds distance defined beforehand, in step ST13, trigger signal IFTS is always outputted.

[0020]

To the 3rd, about the state "where pilot intensity was less than a threshold standard established beforehand" a member handover means and/or a network handover means, It conforms so that it may judge based on surveillance less than an electric power threshold as which the necessity for a handover was beforehand determined to measurement pilot signal intensity. As shown in drawing 3-1 and drawing 4-1, in a modernistic mobile communication system, data communications between base transceiver office RBS and subscriber station MS are carried out

by transmitting data frame FR and transmission frame FR which comprise a control-section CP and data division DP. This is the right about the CDMA frame (drawing 3-1) and a TDMA frame (drawing 4-1) in a GSM system. Control-section CP comprises pilot signal PS at least, and is constituted with control-symbol CS of desirable further others. For example, each base station BS is able to transmit pilot signal PS of fixed electric power on the same frequency. Subscriber station MS can supervise power level of a received pilot signal, and presumes power loss on connection between base station BS and subscriber station MS. Pilot signal intensity is used for presumption of route loss, and when route loss is larger than a route loss threshold defined beforehand, the member handover means HORM outputs trigger signal IFTS in step ST13.

[0021]

To the 4th, about an "excess of power level" state a member handover means and/or a network handover means, In the necessity for a handover, member electric power adjustment module Pulse Amplitude Modulation (drawing 1 is shown in an inside of mobile station MS) answers an increase command in electric power from base station BS, and it suits so that electric power in uplink of communication interface CC may be judged based on surveillance of being unable to increase any longer.

[0022]

Drawing 5 a-d is two or more time-slot TS1... Adjustment of these former about transmission power at the time of exchanging for base transceiver office (generally called node"B") RBS frame FR which consists of TS15 between subscriber station MSs is shown. Electric power adjustment module Pulse Amplitude Modulation in base transceiver office (node "B") RBS presets upper limit threshold PUP, the lower limit threshold PDWN, and offset value POFF to electric power. In the node B, the power offset value POFF is used with low-speed power controls, and a maximum and the lower limit thresholds PUP and PDWN are used with high-speed power controls.

[0023]

The low-speed power controls and high-speed power controls which are shown in drawing 5 b are performed according to the flow chart of drawing 5 c. Step P1 relevant to low-speed power controls (external-control loop) and P2 are performed by the RNC or MS side. In Step P1, the rate FER (or block error rate BLER) of a framing error is measured, and this measured FER (or BLER) is compared with a FER desired value (or BLER desired value) by Step P2. In Step P8, new signal interference ratio desired value SIR-target is obtained.

[0024]

As shown in drawing 5 d, a known relation (it simulated) exists between the logarithm of a delta_SIR_target value (dB) and the measured FER value. Predetermined "working area" exists between two threshold UL_delta_SIR_2 and UL_delta_SIR_1. This relation is simulated to known, i.e., beforehand. As shown in drawing 5 d, delta_SIR_target* is read depending on the logarithm (measured FER) of measured value. New SIR_target value SIR_target is calculated according to the following formulas.

In Step P8, SIR_target=SIR_target+delta_SIR_target* therefore an outside loop, or low-speed power controls always generate a new SIR_target value, when Step P1 and P2 are performed. A new SIR_target value is used by the high-speed power controls (internal loop) performed by the node B or MS side after that, respectively.

[0025]

In Step P5, SIR per slot (signal-to-interference ratio) is measured, and it is compared with a SIR desired value (present) from which the measurement SIR value was acquired at Step P8 by Step P4. If the measurement SIR value is larger than the present SIR desired value, a reduction command will be transmitted to mobile station MS / network, namely, the transmission-power-control parameter TPC will be set to TPC= "00" in Step P7.When the measurement SIR value is smaller than the SIR desired value (present) in Step P4, an increase command is transmitted to mobile station MS / network in Step P6 by setting the transmission-power-control parameter TPC to TPC= "11."

[0026]

The result of gradual adjustment of electric power P_{out} in down-link DL is obtained by low-speed power controls and high-speed power controls as illustrated by drawing 5 b. Since low-speed power controls perform Step P1 and P2 which calculate the frame error rate FER (or block error rate BLER) on every frame (or block), A new SIR-desired value is acquired by frequency lower than the high-speed power controls performed by Step P5, P4, P6, and P7 about each slot.
[0027]
Threshold P_{up} of offset value P_{off} and a high and low side and P_{dwn} are also used for electric power adjustment. For example, when exceeding threshold P_{up} of a side with high output power P_{out}, offset value P_{off} increases slightly, and when the electric power is smaller than threshold P_{dwn} of a low side, offset value P_{off} decreases slightly. Gradual adjustment of electric power is always performed in a power range between P_{dwn} and P_{up}. Since these value P_{off}, P_{up}, and P_{dwn} are merely used for a cause of a soft hand over, relation beyond this with this invention does not have these, and, so, explanation beyond this about this is omitted.
[0028]
as mentioned above, on the 4th "excess of power level" conditions, the node B (base station BS) so that the electric power may be increased to subscriber station MS, [order and] If it reports that electric power adjustment module Pulse Amplitude Modulation in the node B answers increase command TCP in electric power, and the further increase in electric power cannot be found, the network handover means HORM may require measurement by publishing IF trigger signal.
[0029]
About four above-mentioned different conditions, there are many serious disadvantages and some of four explained conditions cannot even perform carrying out in the system (WCDMA) of future wide-band code-division multiple access.
[0030]
As opposed to the reference [1] having described the synchronous CDMA system about an IS-95 standard, Reference [2]:TS25.201 V2.1.0 and a third generation partnership project (3GPP); technical-specification group (TSG); wireless connection network (the physical layer - RAM; working group 1(WG1); --) [and] The version has described the asynchronous WCDMA system and the point-to-multipoint connection used especially there in June, 1999. Although the reference [1] is indicated, in a synchronous system [like], base station BS or subscriber station MS can still evaluate the distance between both (the 2nd trigger condition). This is possible at that in sync with a system clock (locked) with a precise chip rate in a pilot channel and all the channels. This is attained by using Global Positioning System (GPS) in a reference [1]. However, the distance evaluated for the multipass propagation delay between base station BS and subscriber station MS or shadowing may be mistaken. So, the 2nd condition "an excess of distance limitation" may be unable to be said to be very exact.
[0031]
In the 3rd conditions "pilot intensity is less than the threshold standard established beforehand", subscriber station MS must perform measurement which serves as a cause of IF measurement, therefore serves as a cause of a handover. Since subscriber station MS must perform average filtering of a pilot channel between predetermined measuring time, these continuous measurement of pilot signal intensity may shorten the life of the cell of a subscriber station remarkable. Since the reduction in a battery life has IF measurement in another frequency when [at which a subscriber station must perform] many measurement, for example, IF measurement trigger signal IFTS, is already published, etc., it should be avoided in all the environments. furthermore, moreover, by an air interface, subscriber station MS must report pilot signal intensity measurement in a certain form to base transceiver office RBS (node B) and the network control means RNC, and to them, This will make the interference level in the uplink UL, and the load of the signal dispatch in a network increase further. So, when used in relation to the 3rd conditions "pilot intensity is less than the threshold standard established beforehand", Evaluation of the load according to the 1st conditions of "an excess of a base station traffic

load" may cause more signal dispatch for increase of the signal dispatch in a network air interface.
[0032]
So, some of these conditions are not used in a synchronous or asynchronous system, but a battery life becomes short, and the main disadvantages of the trigger mechanism of conventional technology are at the point that the load of the signal dispatch in a network increases with the interference level in the uplink UL.
[0033]
In drawing 2, IF (generated by subscriber station handover means HORM or network handover means HORM) measurement trigger signal IFTS is answered, and a subscriber station performs IF measurement with the time interval given in step ST21. As mentioned above, in order to perform the handover between frequency which is reliable at high speed, signal quality measurement in a target cell or a different system in frequency which is different in subscriber station MS, for example, [perform and] These things are reported to the network control means RNC so that the foundation may be made as for Lycium chinense to the signal quality measurement to which the determination of the handover is reported to the network control means RNC about to which cell the handover of the subscriber station MS will be carried out.
[0034]
Execution of IF measurement by subscriber station MS is not a trifling task so that it may mention later. For example, in CDMA or an FDMA system, the receiver of subscriber station MS usually, In order that a certain measuring time may enable measurement between frequency without the big loss of data in such a system busy therefore receiving information on the present frequency, it carries out somehow or other and must be made. Below, the conventional method for determining the time interval with which field measurement is performed is explained with reference to drawing 3-1, drawing 3-2, drawing 4-1, drawing 4-2, and drawing 6.
[0035]
As already mentioned above with reference to drawing 3-1, with a CDMA communication system, data communications are two or more time slot TS1..... It performs by exchanging data frame FR which comprises TS15. Each time slot has control-section CP and data division DP. It is also possible to perform data communications by compressed mode (called a slot mode), and to make some time about IF measurement as indicated to the reference [2] mentioned above, and as suggested also to step ST21' [of drawing 3-2], and drawing 3-1. That is [the data in which the network control means RNC is included in data division DP for this purpose is compressed], it is collected to a portion smaller than that of a frame, and has the compressed mode setting-out means CMSM which makes standby time part ITP as that result. Subscriber station MS is notified about transmission by compressed mode via the signal transmitted from the compressed mode setting-out means CMSM of the - network control means RNC, or a certain information, and has the determination CMDM, i.e., a compressed mode determination means to take shape, for operation by - and compressed mode. Supposing operation of such compressed mode is detected, subscriber station MS starts operation by compressed mode, will be step ST21" in drawing 3-2, and will perform IF measurement by standby time IT.
[0036]
In a CDMA system, concentration of such information is attained by reducing process gain G= chip / information bit =1/SF, for example, making diffusion coefficient SF small. From r=1/3 to r by which another possibility about concentration of information being attained how changes a channel coding method = it is made by changing into one half. Time interval IT by which IF measurement is performed for operation by compressed mode is generated by the IF measuring means IFMM of subscriber station MS.
[0037]
drawing 4-1 and step SC21 -- "' and ST21 -- "" shows another possibility about having a time interval with which field measurement is performed how. Two or more TDMA time slot TS1 in a GSM system .... Specific time slot FMS of the frame which comprises TS-M is specified, and field measurement is performed in the FMP section. That is, in a GSM system, it has a predetermined field measurement slot by which data is not transmitted to subscriber station MS from the

transmitter of a network control means or a base station.
[0038]
The further way about having a standby time interval how is indicated to the reference [1] about the case where the handover between systems should be performed. In this case, subscriber station MS does not perform measurement by another system, instead the pseudonoise PN sequence received by subscriber station MS on the same frequency as subscriber station MS has already communicated is transmitted in that another system as illustrated by drawing 6. When the electric power of this PN sequence exceeds predetermined time and a predetermined threshold as compared with other PN sequences, the handover between systems is performed.
[0039]
the network control means RNC giving a trigger to a mobile station and step ST13, and performing IF measurement, and as shown in drawing 2, drawing 3-1, and drawing 4-1, Directions are given to subscriber station MS on the frequency belonging to a different cell in which said IF measurement will be performed, or a different system. Subscriber station SS reports IF measurement to the network control means RNC within predetermined time. And in step ST22, it is determined whether a handover is possible for the network control means RNC in the selected frequency (a cell or a different system). for example, since it opts for a too much large interference on the new frequency, If it is impossible, a network control means will choose a new target cell (frequency) in step ST23, and IF measurement will be repeated by subscriber station MS in step ST21. Furthermore, moreover, the network control means RNC can give a command to subscriber station MS, and can perform periodic search or search only for 1 time. Such a procedure is indicated to the reference [1] about the synchronous communications system, for example.
[0040]
In a certain system like CDMA2000. It is shown subscriber station MS not only can report IF measurement to a network control means, but when [how much long (in time) and] (time of onset) can perform now IF measurement of a request of subscriber station MS to the network control means RNC. Supposing the network control means RNC has the knowledge about a time interval that subscriber station MS has intention of execution of IF measurement, the network control means RNC will be transmitted by the network control means RNC, but. Some preparations for compensating with subscriber station MS the data frame which does not process in the time interval which performs the IF measurement can be made. That is, if the further preparation is not made, the data frame will actually be lost in the time interval in which subscriber station MS performs field measurement.
[0041]
One possibility is that the network control means RNC increases electric power before the repeat time or two or more repeat times or to the back. Since the error rate is always evaluated over two or more data frames, such an increase in electric power before and behind the repeat time enables the overall quality about an error rate to hold the demand of a mean error rate on the average level which does not exceed. On the other hand, a similar state also generates the subscriber station MS side. That is, subscriber station MS could not transmit a data frame in the repeat time. So, when subscriber station MS also increases electric power before and behind the determined measuring time, the possible frame which is not transmitted is compensated. So, receiving quality improves by the network control means RNC side the subscriber station MS side. However, an above-mentioned procedure provided with the given time interval in which mobile station MS will perform field measurement by step ST21 (generally this is used by CDMA2000 and IS'95), PN sequence transmission and compensation of the eliminated frame by the increase in electric power will show some big faults, when carrying out by a system, as still shown below.
[0042]
In addition, especially as for a procedure of WCDMA which performs field measurement relevant to operation by compressed mode, in the case of a system, there are the following disadvantages. Since subscriber station MS is provided diffusion coefficient SF in down-link DL with standby time interval IT which will perform field measurement about other systems,

supposing it is made small, an available channelization code will decrease. That is, hard capability of a CDMA system becomes small.
[0043]
on the other hand, a rate of channel coding -- fixed time -- since a CDMA system will perform service using the depth of interleaving which differs about the same radio link as a different coding mode if it becomes large, a device of a complicated numerals speed must be mounted in the network control means RNC.
[0044]
Furthermore, moreover, since the same data information is transmitted with a shorter time interval, i.e., a compressed data period, subscriber station MS must increase the output power, when measurement is performed for operation by compressed mode. If output power of subscriber station MS and/or base transceiver office RBS is not enlarged, the performance will fall. However, this demand of increasing a peak power of subscriber station MS may suggest restriction of distance, supposing member MS has already transmitted by that maximum output power. Since a data field is not protected by even the same grade when a coding rate furthermore becomes low moreover, there is big danger rather than losing information. Therefore, since long time is needed for implementation of IF measurement while compressed data transmission reduces quality by one side, a standby time interval is dramatically short and a handover becomes a low speed.
[0045]
A procedure using PN sequence transmission has the following disadvantages as shown in drawing 6. In this case, an existing mobile communication system of everything but all must be provided with a device which transmits PN sequence detected by subscriber station MS. This means big expense for an employment person (following and taking to an end user). It will interfere in PN sequence further moreover used with another mobile communication system with a CDMA system, and it will reduce capability and quality of data communications.
[0046]
A method stated to the last of making electric power increase before and behind a repeat time, when subscriber station MS wants to perform a handover between ******** on a boundary of a cell probably closely, When a cell (sector) presents a heavy load, and telephone speech quality is already very low, there is a disadvantage that there is a high danger that a frame loss by a repeat time will degrade the telephone speech quality.
[0047]
A subscriber station can determine a repeat time as inner time of data transmission from a network control means. Therefore, IF measurement cannot change with a cause of debasement of connection.
[0048]
When the above-mentioned disadvantage provided with a time interval for IF measurement according to above-mentioned conventional technology is summarized, such a preparation of a time test interval, (For example, for the loss of a frame) A result of deterioration of a quality of service is brought, complicated (for inclusion of PN sequence generator) system reconstruction will be needed, or the battery life of subscriber station MS will be shortened (if electric power increases before and behind the time interval). A time interval is restricted by the standby time length in a compression time slot.
[0049]
(Outline of an invention)
The procedure for which IF measurement was mentioned above a trigger and for performing in the mobile communication system as above-mentioned, Since the battery lives of subscriber station MS are reduced (the specific trigger method use), the quality of service of data communications deteriorates (deficit of a frame) and a system configuration becomes complicated (inclusion of a PN series creating means), generally it is disadvantageous. Since IF measurement can perform only at intervals of the standby time under compressed mode operation, long time is required for execution of a handover. An object of this invention is to avoid the fault described especially at the end at least.

[0050]
Especially the purpose of this invention is to provide the subscriber station, the network control means, method, and mobile communication system which make IF measurement easy, maintaining the transmission quality.
[0051]
A mobile communication system with which this purpose has at least one base transceiver office and a network control means, It is the subscriber station (claim 1) included IF measuring means which suited so that IF measurement between frequency might be performed, It has a time interval signal detection means which detects IF repeat-time indication signal which shows a time interval of established connection between said subscriber station in transmission from said network control means, and said base transceiver office, A subscriber station conforming so that said IF measuring means may perform said IF measurement with said time interval shown in said IF repeat-time indication signal is solved.
[0052]
This purpose is a method (claim 13) for carrying out IF measurement between frequency again in a subscriber station of a mobile communication system which has at least one base transceiver office and a network control means, In a network control means, IF repeat time is chosen during connection between said subscriber station and said base transceiver office, A step which transmits IF repeat-time indication signal which shows a time interval of said connection by which said IF measurement should be made by said subscriber station to said subscriber station from said network control means, It is solved also by a method of having a step which detects said IF repeat-time indication signal in said subscriber station, and a step which carries out said IF measurement in said subscriber station with said time interval of said connection shown by said IF repeat-time indication signal.
[0053]
At least one subscriber station which has IF measuring means which suited so that this purpose might carry out IF measurement between frequency again, It is a mobile communication system (claim 33) which has a network control means for performing said subscriber station and data communications during at least one a base transceiver office and connection, Said network control means chooses the time interval of said connection to which said subscriber station should carry out IF measurement, It has IF repeat-time selecting means which suited so that IF repeat-time indication signal which shows said time interval might be transmitted to said subscriber station, It has the time interval signal detection means which suited so that said subscriber station might detect said IF repeat-time indication signal which shows said time interval within transmission from said network control means, Said IF measuring means is solved also by the mobile communication system conforming so that said IF measurement may be performed with said time interval shown with said detected IF repeat-time indication signal.
[0054]
In order that this purpose may control again the data communications on the communication interface established between a subscriber station and at least one base transceiver office at least, While it is a network control means (claim 44) of a mobile communication system, and suiting so that said subscriber station may choose the time interval of the connection which should perform measurement, The network control means having IF repeat-time selecting means which suited so that IF repeat-time indication signal might be transmitted to said subscriber station is also solved.
[0055]
According to the 1st standpoint of this invention, it has IF selecting means as which a network control means chooses the time interval as which said channel with which said subscriber station should perform IF measurement was determined beforehand. This selected time interval defined beforehand is transmitted to a subscriber station in IF repeat-time indication signal which shows the selected time interval to that subscriber station defined beforehand.
[0056]
A subscriber station has a time interval signal detection means, in order to detect said IF repeat-time indication signal within transmission from a network control means. IF measurement

is performed after that with the time interval with the subscriber station selected in the network control means defined beforehand. Therefore, it can be shown by the network what period subscriber station a subscriber station is attained to when and measures on another frequency. That is, IF repeat-time indication signal specifies the length of the time interval which should perform IF measurement in start timing and a subscriber station. It can be compensated whether in this selected time interval, degradation of the temporary transmission quality to which a network control means supplies a subscriber station is permissible, About degradation of the transmission quality which may happen, for example, the deficit of data, since it can do based on the time interval the network control means already judged that it is compensated after that, it is not necessary to care.

[0057]

According to the 2nd standpoint of this invention, a subscriber station and/or a base transceiver office supervise the quality of service on the established communication interface, and have the switching performance monitor means which suited so that the information on the quality of service might be transmitted to said network control means. In such a case, a network control means chooses said time interval of said communication interface defined beforehand based on the information on the quality of service to which it was reported from the switching performance monitor means. If possible, a time interval is chosen with the time interval allowed temporary degradation of the quality of service resulting from said IF measuring means carrying out said IF measurement. It is that the network control means knows a priori what directions of the time interval to a subscriber station will always serve as a deterioration cause of the send state for as well as the strong point of such a procedure when a subscriber station actually performs IF measurement with this time interval. However, when it is checked that the network control means had pointed to the time interval which can permit temporary quality degradation, a network control means can be made for the preparations for offsetting this quality degradation in this selected time interval after that.

[0058]

According to the 3rd standpoint of this invention, data communications sensitive to delay are carried out between the base transceiver office on said established connection, and a subscriber station. When IF measurement is performed during data communications sensitive to delay, this suggests that the data slot (a part of frame) of the frame on connection is lost, i.e., aggravation of a quality of service. However, when a subscriber station and a network control means direct to increase the down-link of a communication interface, and the transmission power of a rise ring, respectively before the start of said time interval defined beforehand, and/or after the end of said time interval to a power regulating means, they can offset this quality deterioration. That is, although a loss of data always occurs in data communications sensitive to delay in the time interval with which IF measurement is performed, an average error ratio is kept the same for it to be convenient.

[0059]

According to the 4th standpoint of this invention, data communications sensitive to a deficit are carried out between a base transceiver office and a subscriber station. The information flow between a network and a subscriber station is not usually so dense between types sensitive to the deficit of a connection service, and the buffer used by the network side during the connection is less than the specified threshold. In such a case, in the time interval that a transmission buffer means is not thoroughly filled by send data, the network can demand to measure on other frequency/systems to a subscriber station.

[0060]

That is, it is possible to store temporarily said some said transmission [by which said IF measuring means is performed by IF measuring means of a subscriber station] data by which the transmission buffer in a network should be transmitted into said time interval at least in said selected, selected time interval. The data (a time slot, for example, the time slot in GSM, or data frame of WCDMA) stored further is transmitted to a subscriber station after the end of a time interval so that a loss of data may not occur.

[0061]

According to the 5th standpoint of this invention, with use of the transmission buffer means about the connection service of a form sensitive to a loss, a network control means reduces the data transmission rate in a time interval, and after said time interval is completed, it suits so that a data transmission rate may be made to increase again. It is avoided that a buffer means is quickly fulfilled by making it such since the speed which data reaches is reduced.
[0062]
According to the 6th standpoint of this invention, it is possible to carry out re-scheduling with use of the transmission buffer means by the 4th and 5th standpoints, using other buffer means, in order for a network control means to make the capacity of the intermediate memory of transmission data increase. In order to make the buffer size of a transmission buffer means increase and to decrease temporarily the buffer size of other buffer means which are not used into a time interval, it is also possible to perform dynamic buffer scheduling which used other buffers. It restricts, when not performing buffer re-scheduling or dynamic buffer schedule management, either, in order to make transmitting buffer size increase, and finally the deleting means of a network control means deletes at least one copy of the data which should be transmitted into said time interval.
[0063]
According to the 7th standpoint of this invention, the data communications between a base transceiver office and a subscriber station are performed in the compressed mode operation by which some data is compressed into a time slot. And IF measurement is carried out in the standby time portion of the data frame from which it is the time interval preferably shown in IF repeat-time indication signal, and data communications are performed by compressed mode. Therefore, it is requested when the network should measure the frequency of others [subscriber station / of how much / length] to a subscriber station in this case. It is usable as a complement of compressed mode in this.
[0064]
The another advantageous example and improvement point of this invention will be obtained from the dependent claim. This invention can include the example separately acquired from the combination of description and/or the standpoint by which the claim is carried out, and the feature in this specification and/or an attached claim.
[0065]
Hereafter, the example of this invention is described with reference to an accompanying drawing.

Here, please care about that an identical or similar reference number shows an identical or similar step and function through a drawing. Especially each part explained to conventional subscriber station MS and the conventional network control means RNC in drawing 2 exists also in the example of this invention. Please care about that this invention is not limited to specific CDMA mentioned above, WCDMA, D-AMPS, or a GSM system. If it puts in another way, this invention is applicable to the arbitrary telecommunication systems which need to carry out a handover between frequency, a cell, and a different system.
[0066]
(Principle of an invention)
Please care about that a handover procedure and IF measurement are performed [at both the time of setting out of communications system CC, or the time of signaling connection only being set to mobile station MS under non-active mode operation].
[0067]
Drawing 7 shows the fundamental block diagram of the mobile communication system T1 by this invention. Mobile station MS has the time interval signal detection means TSIDM which suited so that IF repeat-time indication signal TIIS which shows the time interval which was transmitting from the network control means RNC and was defined beforehand might be detected in addition to each part already shown in drawing 1 by a conventional example. The network control means RNC has IF repeat-time selecting means TISM which suited so that said time interval of said connection in which said subscriber station MS should perform said IF measurement defined beforehand might be chosen. As shown in drawing 7, the time interval selecting means TISM

transmits said IF repeat-time indication signal TIIS to said subscriber station MS.
[0068]
Therefore, it is possible by using the time interval selecting means TISM within the network control means RNC, and the time interval signal detection means TSIDM in subscriber station MS to specify a time interval from the network control means RNC to subscriber station MS. Therefore, subscriber station MS does not need to perform a judgment of any kind itself, and it can trust thoroughly that a time interval is suitable based on the directions from a network control means.
[0069]
As shown in drawing 8, IF measuring means conforms in step ST13 of drawing 8 fundamentally so that IF measurement trigger signal IFTS which the handover means HORM within subscriber station MS or the network control means RNC generates may be answered and said IF measurement may be performed. In Step S211, the network control means RNC is a time interval with which IF measurement should be performed.
The network control means RNC determines a time interval which determines that temporary quality degradation can be permitted.
This time interval is transmitted to mobile station MS in step ST211.
[0070]
In step ST212, the IF measuring means IFMM performs said IF measurement with said time interval which was directed into IF repeat-time indication signal TIIS transmitted from said detected network control means and which was defined beforehand. Other steps in drawing 8 are the same as that of drawing 2.
[0071]
As a conventional example about compressed mode operation was explained, in compressed mode operation, only short standby time interval IF is available to execution of IF field measurement. However, according to the principle of this invention, a planned time interval which can permit temporary quality degradation is used. So that quality degradation in which a network control means is constant even when IF measurement is carried out may be accepted or it can compensate by network control means or a subscriber station, Since a subscriber station is able to trust having determined a suitable time interval thoroughly, when a subscriber station receives directions of this time interval, it can start IF measurement promptly. That is, in inside of a time interval in which a subscriber station carries out IF measurement, since data exchange between a subscriber station and a network is impossible, temporary deterioration of a quality of service resulting from IF measurement generates it.
[0072]
However, as for a network control means, it is possible for deterioration of such a quality of service to determine autonomously a time interval which does not bring about evil as the whole transmission. Usually, a time interval directed by a network control means is below a standby time interval in compressed mode operation. Since the member does not need to wait for a start of compressed mode operation, it is possible to make a handover decision between systems between more nearly high-speed frequency so that it is [therefore] possible to perform IF measurement a little early. This is because it has the capability to perform measurement other than measurement execution only using compressed mode art, when a subscriber station uses a proposed method. That is, in some situations, it is difficult to determine not to lose connection early. Therefore, unless quality degradation is as severe as transmission is interrupted, a more nearly high-speed handover is attained in IF measurement that it can perform [as a result] still promptly.
[0073]
Preferably, IF repeat-time indication signal TIIS is transmitted within said IF measurement trigger signal IFTS from said IF repeat-time selecting means TISM. That is, the network control means RNC is able to determine first fundamentally that there is the necessity for a handover, and that the subscriber station needs the trigger of IF measurement. However, the network control means RNC can suspend transmission of a trigger signal until the time interval with which IF measurement should be performed is determined. And it is possible to also convey the

information about the time interval as which IF measurement trigger signal was chosen, for example by both both directions of a trigger signal and a time interval becoming ability ready for sending to a subscriber station.

[0074]

Therefore, when a network is determined about when a subscriber station should measure another frequency in the same system or other systems in which period (or for two or more of which terms), A subscriber station has the capability to carry out these measurement, even if the quality of service (QoS) of the present service (singular number or plurality) deteriorates temporarily.

[0075]

In order to enable suitable determination of a time interval, the network control means RNC (and/or, subscriber station MS) supervises quality-of-service QoS of the established communication interface, It is possible to have the switching performance measuring means CQMM which suited so that the information on quality-of-service QoS might be transmitted to the network control means RNC. The switching performance monitor means CQMM may be arranged in base transceiver office RBS again. The switching performance monitor means CQMM supplies some information on a quality of service to the time interval selecting means TISM. Therefore, if possible, a time interval can be chosen with the time interval allowed temporary deterioration of the quality of service by said IF measuring means IFMM performing said IF measurement.

[0076]

Therefore, when a temporary fall of quality-of-service QoS in a communication interface is allowed as above-mentioned, subscriber station MS can use degradation of this service for measurement between frequency. The network can determine one or more time intervals allowed the fall of quality-of-service QoS, and can perform measurement between frequency in the time interval. A network control means has knowledge not only about the switching performance about both uplink and a down-link but about a system configuration. Therefore, the network control means has the best possibility for determining just whether a subscriber station should perform measurement about another frequency, and when ** should carry out the measurements of length of how much. Of course, a switching performance is good, and when other frequency or systems which measure do not exist, subscriber station MS does not need to carry out a handover.

[0077]

Of course, the principle of this invention needs to direct in which interval (one or more) subscriber station MS should perform measurement between frequency when via IF measuring time indication signal TIIS with which the network control means was detected. As mentioned above, this information may be included in a trigger signal.

[0078]

The switching performance monitor means CQMM transmits the information on a quality of service to a network control means. The switching performance monitor means CQMM is ability ready for sending also about the information on the intact buffer used for the connection in a network. That is, in any communications systems, before being transmitted to a subscriber station, the transmission buffer which stores send data temporarily is used. (It has been arranged at the subscriber station, the base transceiver office, and/or the network control means) The switching performance monitor means CQMM has again the knowledge of system configurations, such as other frequency in the system in the field where the subscriber station established connection, and other systems. Therefore, based on all this information, the time interval selecting means TISM can choose the best time interval which temporary deterioration of the transmission quality can still permit.

[0079]

The network control means can perform the increase in electric power at the time of the preparation for offsetting temporary degradation of transmission resulting from IF measurement, for example, the start of a time interval, and an end so that it may explain below with reference to the example of this invention. Instead, transmitting buffer size can also be adjusted (buffer

size is increased or an additional buffer is used), In order to reduce the coming data volume and to reduce the data volume which needs to be stored in a transmission buffer, it is also possible to reduce a transmission rate in the time interval defined beforehand.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

(The 1st example)
Generally, in a communications system, it is distinguishable in service of a different form, i.e., service sensitive to delay, and service sensitive to a deficit. When service form is sensitive to delay, it is more important also for a certain ****** than having no error that transmitted information is received on time. For example, a sound is transmission sensitive to delay.
[0081]
On the other hand, when service form is sensitive to a deficit, it is important that information is received without exceeding an error which can correct a decryption machine within a subscriber station or a network control means. When a packet contains an unrecoverable error, the packet is translated as what was lost. For example, web browsing will reach late, although information will reach early, but since it is not related, it is service sensitive to a deficit.
[0082]
The 1st example of this invention is related with how minimization or reduction of quality-of-service QoS usable to measurement between frequency to a case of service sensitive to delay is performed.
[0083]
When transmission sensitive to delay is carried out during a communication interface between subscriber station MS and base transceiver office RBS (or network control means RNC), a subscriber station has deleting means DEL which deletes data which reached into said selected time interval from base transceiver office RBS. Such a situation For example, specific time for the network control means RNC to originate in some standards (for example, a poor measurement report by a high frame error rate and/or a mobile station, low received signal strength, and/or the bad signal-to-interference ratio SIR) at subscriber station MS and a period, It generates, when it requires and subscriber station SS and base transceiver office RBS establish voice connection, i.e., service sensitive to delay, so that measurement about other frequency or systems may be performed to subscriber station MS. Probably this will suggest a slot (path of a frame) on the present connection, or a loss of a frame. Such a frame is because IF measurement needs to be deleted by subscriber station in a time interval performed. In order to offset temporary deterioration of this quality of service, said network control means RNC and/or said subscriber station MS, respectively, It can have power control means Pulse Amplitude Modulation for increasing down-link DL of communication interface CC, and transmission power on the uplink UL before a start of said time interval defined beforehand, and/or after an end, respectively.
[0084]
For example, when set beforehand, in order for the network control means RNC to determine that said subscriber station MS should perform IF measurement and to make transmission power on uplink increase between the ten following data frames after 10 data frames, (Setting for a procedure for example, using transmission-control flag TCP) It is ability ready for sending in subscriber station MS about an indication signal. A network control means makes transmission power on its down-link DL increase again.
[0085]

Simultaneously, a network control means directs the transmission power to make it increase about two or more data frames (for example, 10) after an end of a time interval directed to subscriber station MS. When a time interval is completed, a network control means makes transmission power on its down-link similarly increase again. Such electric power adjustment can be carried out in a high speed and a low-speed power-controls cycle which were mentioned above about drawing 5.

[0086]

Of course, since subscriber station MS is busy with performing IF measurement even if transmission power on uplink and a down-link is increased before and after a time interval, a period when data is not transmitted or received still exists in an inside of the time interval. Therefore, an error rate increases fundamentally. However, a rise of this error rate is compensable by the increase in transmission power. As for an error rate, it is only calculated about an average of many data frames. Therefore, degradation of the transmission quality between IF repeat times is compensable by making transmission power increase in the beginning of a time interval, or the last. Therefore, overall deterioration of a quality of service does not take place.

[Translation done.]